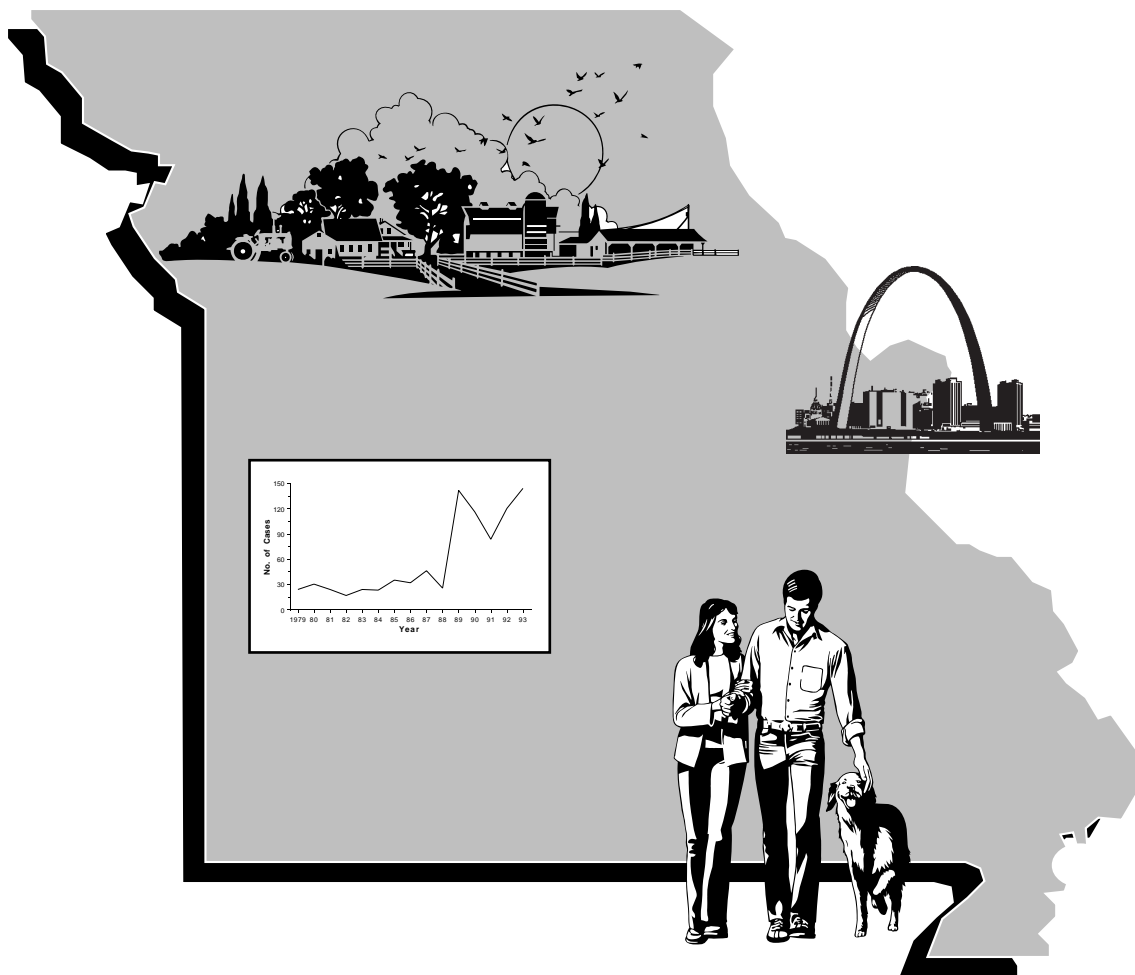


Reportable Diseases and Conditions in Missouri



BIENNIAL REPORT 1992-93



Missouri Department of

HEALTH



Reportable Diseases and Conditions in Missouri

H. Denny Donnell, Jr., M.D., M.P.H.
Director, Office of Epidemiology

Contributors

Tom Hicks, Chief
Bureau of Immunization

Bill Huber, Chief
Bureau of Sexually Transmitted Diseases and HIV Prevention

Daryl Roberts, M.Ed., Chief
Bureau of Environmental Epidemiology

Daniel Ruggiero, M.P.A., Chief
Bureau of Tuberculosis Control

Mahree Skala, M.A.
Chief, Bureau of Communicable Disease Control

F. T. Satalowich, D.V.M., M.S.P.H., Chief
Bureau of Veterinary Public Health

Production Manager

Diane C. Rackers
Office of Epidemiology

Under the Direction of

Coleen Kivlahan, M.D., M.S.P.H.
Director, Missouri Department of Health

William R. Schmidt, M.P.H., PA-C
Director, Division of Environmental Health and Epidemiology

Missouri Department of Health
Jefferson City, Missouri

Published September 1994

Alternate forms of this publication for persons with disabilities may be obtained by contacting the Missouri Department of Health,
Division of Environmental Health and Epidemiology, Office of Epidemiology, P.O. Box 570, Jefferson City, MO 65102, (314) 751-6128.
TDD users can access the preceding phone number by calling 1-800-735-2966.

EEO/AAP services provided on a non-discriminatory basis.

The mission of the
Division of Environmental Health
and Epidemiology
is to promote health and
prevent illness and death
in the public due to
communicable diseases and
environmental conditions.

Table of Contents

Introduction	1
Map of Department of Health Districts	2
Department of Health Reporting Rules	3
Missouri's Selected Communicable Diseases - 15 Year Report	6
Diseases of the Gastrointestinal Tract	
Campylobacteriosis	7
<i>E. Coli</i> O157:H7	8
Giardiasis	9
Salmonellosis	10
Shigellosis	12
Yersiniosis	14
Diseases of the Nervous System	
Aseptic Meningitis	15
Meningococcal Meningitis	16
Hepatitis	
Viral Hepatitis A	17
Viral Hepatitis B	19
Non-A Non-B Hepatitis	20
Immunizable Diseases	
Diphtheria	21
<i>Haemophilus influenzae</i> , type B	22
Influenza	23
Measles	25
Mumps	26
Pertussis	27
Poliomyelitis, Acute	29
Rubella	30
Sexually Transmitted Diseases	
<i>Chlamydia trachomatis</i> Infections	31
Genital Herpes	32
Gonococcal Pelvic Inflammatory Disease	32
Gonorrhea	33
HIV/AIDS	34
Non-gonococcal Urethritis	37
Penicillinase-producing <i>N. gonorrhea</i>	37
Syphilis (Congenital)	38
Syphilis (Primary, Secondary and Early Latent under one year)	40

Tuberculosis	41
Zoonotic Diseases	
Animal Bites	45
Arthropod-borne Viral Encephalitides	46
Brucellosis	47
Ehrlichiosis	48
Histoplasmosis	49
Leptospirosis	50
Lyme Disease	51
Psittacosis	53
Rabies	54
Rocky Mountain Spotted Fever	56
Tularemia	57
Other Reportable Diseases	59
Chickenpox	
Fifth Disease	
Pediculosis	
Scabies	
Scarlet Fever	
Diseases of Low Incidence	61
Kawasaki Disease	
Legionellosis	
<i>Listeria monocytogenes</i>	
Malaria	
Tetanus	
Toxic Shock Syndrome	
Other Reportable Conditions	
Childhood Lead Poisoning	63

Introduction

This is the second biennial report of the disease incidence data received by the Missouri Department of Health (DOH), Division of Environmental Health and Epidemiology in the decade of the nineties. It contains information about the reportable communicable diseases, including tuberculosis, AIDS and other sexually transmitted diseases. The information should be useful to health care professionals, public health professionals and policy-makers.

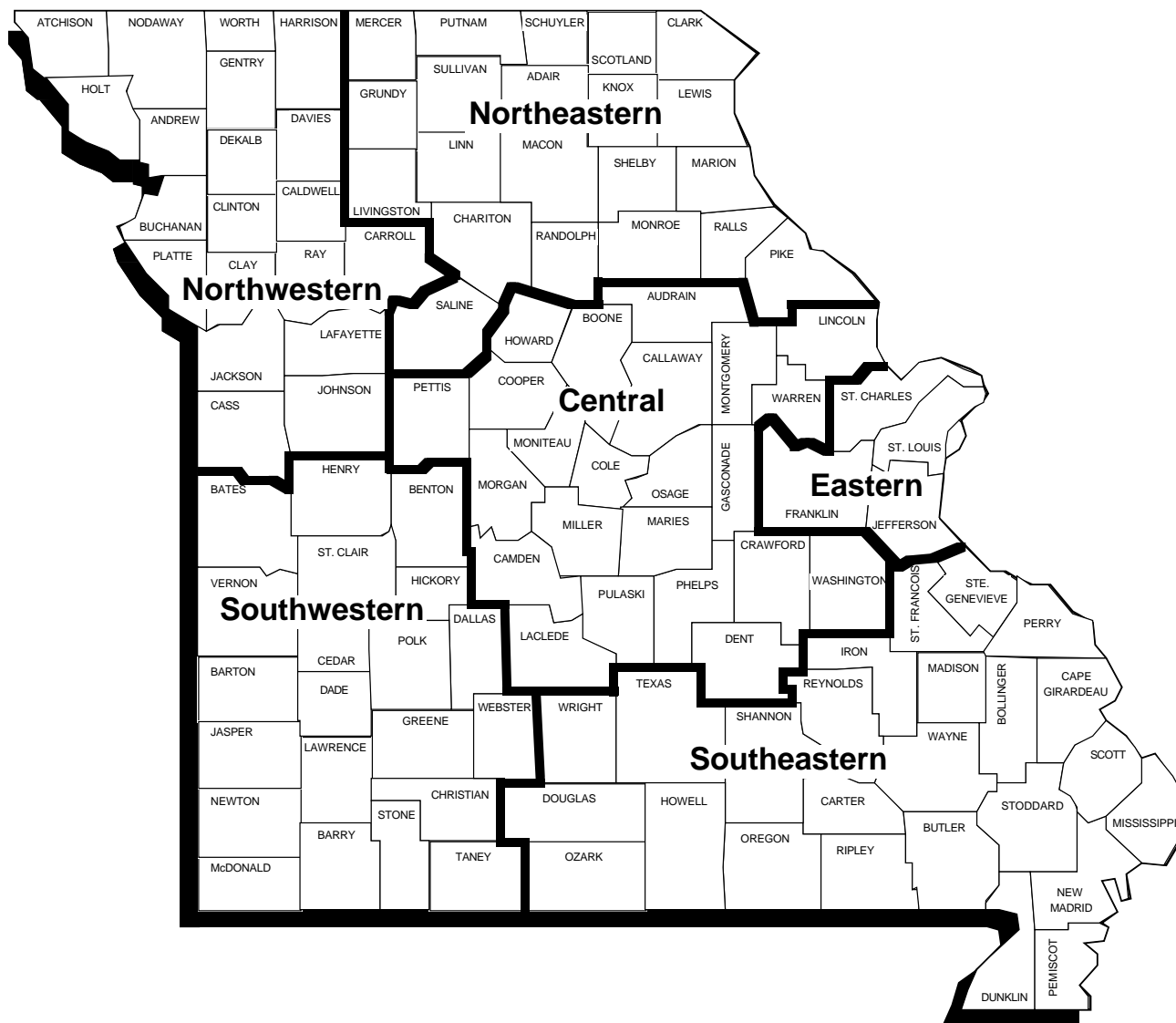
Each of the major diseases is presented with a brief introduction and summaries of the key statistics and trends, supplemented by tables and graphs. To help put the disease trends into perspective, graphs are presented showing the trends for the 15-year period 1979–1993.

Reports of diseases of low incidence are provided in table form. Another table shows the data for diseases reported in large numbers through an active sentinel system that does not identify individuals. In this table, the much smaller numbers of cases reported through the passive surveillance system are included, so there may be some duplication.

Physicians and laboratories are required by law to report cases of diseases specified by the Department of Health. Reports are routed in some cases through local health departments and in other cases directly to the state agency. Reports are evaluated in local health departments and by a network of DOH communicable disease coordinators in district offices to determine if they meet case definitions and to determine if follow-up or intervention is required.

The reported information is often supplemented by additional data collected by contacting the reporting source. Case reports of certain diseases are followed by local or DOH investigators to assure that patients receive appropriate treatment and that contacts are afforded the benefits of preventive measures and education. Examples of these diseases are tuberculosis, syphilis, HIV/AIDS, hepatitis, meningitis and measles. Reports of single cases or small numbers of unusual diseases may lead to discovery of outbreaks for which further investigation may stimulate specific recommendations for control measures to interrupt the transmission. Reports may identify groups at high risk, leading to targeted intervention efforts with those groups. Data also help in health planning, policy making and research.

Department of Health Districts



Central District Health Office

1001-A Southwest Boulevard
Jefferson City, MO 65101
(314) 751-4216

Eastern District Health Office

Two Campbell Plaza
59th and Arsenal, Suite 200
St. Louis, MO 63139
(314) 877-2800

Northeastern District Health Office

250 Patton Street, P.O. Box 309
Macon, MO 63552
(816) 385-3125

Northwestern District Health Office

219 North Chestnut, Box 230
Cameron, MO 64429
(816) 632-2107

Southeastern District Health Office

2875 James Boulevard
Poplar Bluff, MO 63901
(314) 840-9720

Southwestern District Health Office

P.O. Box 777, MPO
1414 West Elfindale
Springfield, MO 65801
(417) 895-6900

Department of Health Reporting Rules

19 CSR 20-20.020 Reporting Communicable, Environmental and Occupational Diseases

PURPOSE: *This rule designates the diseases, disabilities, conditions and findings that must be reported to the Department of Health. It also establishes when they must be reported.*

*Editor's Note: The secretary of state has determined that publication of this rule in its entirety would be unduly cumbersome or expensive. The entire text of the rule has been filed with the secretary of state. Section (3) (the only part of the rule not published in its entirety) names a publication in the **Federal Register** which has been filed with the secretary of state. The entire text of the rule is also available from the Department of Health, Division of Environmental Health and Epidemiology, and is available to any interested person at a cost not more than the actual cost of reproduction.*

(1) Category I diseases must be reported to the Department of Health or to the local health authority within twenty-four (24) hours of suspected diagnosis by telephone, telegraph or other rapid communication, followed by a written report within seven (7) days. Category I diseases are—

- Animal bites;
- Botulism;
- Chlamydia trachomatis infections;
- Diphtheria;
- Epidemics—foodborne, toxic substances and others;
- Gonorrhea;
- Hepatitis A;
- Invasive Hemophilus influenzae disease other than meningitis;
- Measles;
- Meningitis, Hemophilus influenzae;
- Meningitis, meningococcal;
- Poliomyelitis;
- Rabies;
- Rubella;
- Syphilis; and
- Typhoid fever.

(2) Category II diseases or findings shall be reported to the Department of Health or to the local health authority on forms provided by the Department of Health within seven (7) days of suspected or established diagnosis. Category II diseases or findings are—

- Acquired immune deficiency syndrome (AIDS);
- Amebiasis;
- Anthrax;

- Brucellosis;
- Campylobacter infections;
- Chancroid;
- Chickenpox, aggregate data only;
- Cholera;
- Disease due to mycobacteria other than tuberculosis (MOTT);
- E. coli* O157:H7;
- Encephalitis, post-infectious;
- Encephalitis, primary;
- Erythema infectiosum outbreaks;
- Genital herpes;
- Giardiasis;
- Granuloma inguinale;
- Hepatitis B and non-A, non-B;
- Histoplasmosis outbreaks;
- Human immunodeficiency virus (HIV) infection, confirmed;
- Influenza outbreaks;
- Kawasaki disease;
- Legionellosis;
- Leptospirosis;
- Listeria monocytogenes;
- Lyme disease;
- Lymphogranuloma venereum;
- Malaria;
- Meningitis, aseptic;
- Mumps;
- Nongonococcal urethritis;
- Nosocomial outbreaks;
- Pediculosis outbreaks;
- Pertussis;
- Plague;
- Psittacosis;
- Reye syndrome;
- Rheumatic fever, acute;
- Rocky Mountain spotted fever;
- Salmonella infections;
- Scabies outbreaks;
- Scarlet fever (scarlatina), aggregate data only;
- Shigella infections;
- Tetanus;
- T-Helper (CD4+) lymphocyte count on any person with HIV infection;
- Toxic shock syndrome;
- Trichinosis;
- Tuberculosis disease;
- Tuberculosis infection;
- Tularemia; and
- Yersinia enterocolitica*.

(3) Category III diseases or findings resulting from exposure to a toxic substance or to a radioactive substance that are indicative of a public health, occupational health, or environmental problem shall be reported to the Department of Health or the local health authority within twenty-four (24) hours of suspected or established diagnosis by telephone, telegraph or other rapid communication followed by a written report within seven (7) days. Category III diseases or findings are—

- Acute chemical poisoning as defined in 56 FR 52166-75;
- Carbon monoxide poisoning;
- Hyperthermia;
- Hypothermia;
- Methemoglobinemia; and
- Pesticide poisoning.

(4) Category IV diseases or findings resulting from exposure to a toxic substance or to a radioactive substance that are indicative of a public health, occupational health or environmental problem shall be reported to the Department of Health or to the local health authority on forms provided by the Department of Health within seven (7) days of suspected or established diagnosis. Category IV diseases or findings are—

- Lead exposure greater than or equal to ten micrograms per deciliter ($\geq 10 \mu\text{g/dl}$) in persons under age eighteen (< 18) or greater than or equal to twenty-five micrograms per deciliter ($\geq 25 \mu\text{g/dl}$) in persons age eighteen or greater (≥ 18);
- Occupational lung diseases including silicosis, asbestosis, byssinosis, farmer's lung and toxic organic dust syndrome;
- Other heavy metal poisoning including mercury, arsenic and cadmium; and
- Respiratory diseases triggered by environmental factors including environmentally or occupationally induced asthma and bronchitis.

(5) The occurrence of epidemics or outbreaks of any illness or disease which may be of public health concern, including any illness in a food handler that is potentially transmissible through food, shall be reported to the Department of Health or the local health authority by telephone, telegraph or other rapid communication within twenty-four (24) hours of suspected diagnosis followed by a written report within seven (7) days.

(6) A physician attending any person who is suffering from any disease, condition or finding listed in sections (1)–(5) of this rule, or who is suspected of having any of those diseases, conditions or findings or who is suspected of being a carrier of any of those diseases, conditions or findings shall report to the Department of Health or the local health authority within the specified time that person's name, address, age, sex, race, name of disease, condition or finding diagnosed or suspected and the date of onset of the illness.

(A) A physician attending any patient, with any disease, condition or finding listed in sections (1)–(5) of this rule, who is in a hospital, clinic or other private or public institution may authorize, in writing, the chief executive officer or designee of the hospital, clinic or institution to submit reports of reportable diseases or findings on patients attended by the physician at the hospital, clinic or institution. But under no other circumstances shall the physician be relieved of this reporting responsibility. Each report shall include the name, age, sex, race and the address of the patient, the disease or finding diagnosed or suspected, the date of onset of illness and whether the patient is hospitalized. If the patient is hospitalized, the name and address of the hospital, date of report, the name and address of the attending physician and any appropriate laboratory results must be included in the report.

(B) A physician's report of epidemics as required in section (5) of this rule shall include the diagnosis or principal symptoms, the approximate number of cases, the local health authority jurisdiction within which the cases occurred and the name and address of the reporting physician.

(7) Any person in charge of a public or private school, summer camp or day care center immediately shall report to the local health authority the presence or suspected presence of any diseases or findings listed in sections (1)–(5) of this rule.

(8) All local health authorities shall forward to the Department of Health reports of all diseases or findings listed in sections (1)–(5) of this rule. All reports shall be forwarded within twenty-four (24) hours after being received, according to procedures established by the Department of Health director. The local health authority shall transcribe from the original report any information necessary to carry out the required duties in 19 CSR 20-20.040 (2), (3) and (3)(A).

(9) All individual morbidity reports received by a local health authority or the Department of Health are to be considered confidential records and not public records.

*Auth: sections 192.005.2 and 192.020, RSMo (1986). * This rule was previously filed as 13 CSR 50-101.020. Original rule filed July 15, 1948, effective Sept. 13, 1948. Amended: Filed Sept. 1, 1981, effective Dec. 11, 1981. Rescinded and readopted: Filed Nov. 23, 1982, effective March 11, 1983. Emergency amendment filed June 10, 1983, effective June 20, 1983., expired Sept. 10, 1983. Amended: Filed June 10, 1983, effective Sept. 11, 1983. Amended: Filed Nov. 4, 1985, effective March 24, 1986. Amended: Filed Aug. 4, 1986, effective Oct. 11, 1986. Amended: Filed June 3, 1987, effective Oct. 25, 1987. Emergency amendment filed June 16, 1989, effective June 26, 1989, expired Oct. 23, 1989. Amended: Filed July 18, 1989, effective Sept. 28, 1989. Amended: Filed Nov. 2, 1990, effective March 14, 1991. Emergency amendment filed Oct. 2, 1991, effective Oct. 12, 1991, expired Feb. 8, 1992. Amended: Filed Oct. 2, 1991, effective Feb. 6, 1992. Amended: Filed Jan. 31, 1992, effective June 25, 1992. Amended: Filed Aug. 14, 1992, effective April 8, 1993.*

**Original authority: 192.005.2, RSMo (1985) and 192.020, RSMo (1939), amended 1945, 1951.*

19 CSR 20-20.080 Duties of Laboratories

PURPOSE: *This rule establishes the responsibility of laboratories to report to the Missouri Department of Health the results of all positive tests for specified diseases.*

(1) The director or person in charge of any laboratory shall report to the local health authority or the Missouri Department of Health the result of any test that is positive for, or suggestive of, any disease listed in 19 CSR 20-20.020. These reports shall be made according to the time and manner specified for each disease or condition following completion of the test and shall designate the test performed, the results of test, the name and address of the attending physician, the name of the disease or condition diagnosed or suspected, the date the test results were obtained, the name of the patient and the patient's age, sex and race.

(2) In reporting findings for Category III and Category IV diseases listed in 19 CSR 20-20.020(3) and (4), laboratories shall report—

- Blood or serum chemical/pesticide level greater than the Lowest Quantifiable Limit;
- Blood lead level greater than or equal to ten micrograms per deciliter ($\geq 10 \mu\text{g/dl}$) in persons under age eighteen (< 18) or greater than or equal to twenty-five micrograms per deciliter ($\geq 25 \mu\text{g/dl}$) in persons age eighteen or greater (≥ 18);
- Blood mercury level greater than or equal to three-tenths micrograms per deciliter ($\geq 0.3 \mu\text{g/dl}$);
- Carboxyhemoglobin level greater than fifteen percent (15%);
- Urinary arsenic level greater than or equal to one hundred micrograms per liter ($\geq 100 \mu\text{g/l}$);
- Urinary cadmium level greater than or equal to one microgram per liter ($\geq 1.0 \mu\text{g/l}$); and
- Urinary mercury level greater than or equal to twenty micrograms per liter ($\geq 20 \mu\text{g/l}$).

*Auth: sections 192.005.2 and 192.020, RSMo (1986). * This rule was previously filed as 13 CSR 50-101.090. Original rule filed July 15, 1948, effective Sept. 13, 1948. Amended: Filed Aug. 4, 1986, effective Oct. 11, 1986. Amended: Filed Aug. 14, 1992, effective April 8, 1993.*

**Original authority: 192.005.2, RSMo (1985) and 192.020, RSMo (1939) amended 1945, 1951.*

Missouri Morbidity and Mortality Reports of Selected Communicable Diseases - 15 Year Report

	1993	1992	1991	1990	1989	1988	1987	1986	1985	1984	1983	1982	1981	1980	1979
AIDS	1664	662	656	599	481	403	239	91	52	28	6	1	-	-	-
Amebiasis	54	23	25	26	19	30	27	26	28	44	45	11	28	15	29
Brucellosis	0	0	3	1	2	4	14	4	12	7	4	4	4	3	6
Campylobacter	616	614	602	547	473	441	260	281	304	260	166	115	78	49	-
Chickenpox	9609	10009	7678	10591	9086	11350	8595	5093	2474	2565	408	637	880	2331	3510
Chlamydia	11625	11907	10643	11151	8151	6239	2944	1532	412	9	-	-	-	-	-
Encephalitis, Inf.	26	16	22	12	6	8	11	13	12	11	28	16	10	13	16
Giardiasis	770	739	790	878	859	654	690	516	458	462	216	235	113	77	72
Gonorrhea	13147	14887	17450	20012	21053	17241	16491	19029	20023	20042	20750	21269	22249	21640	21395
Haemophilus influenzae type B															
Meningitis	12	22	42	88	106	138	131	172	108	104	86	66	-	-	-
Other Invasive	123	59	39	57	-	-	-	-	-	-	-	-	-	-	-
Hepatitis A	1443	1500	653	619	810	897	560	126	98	138	123	204	282	254	392
Hepatitis B	585	535	549	633	704	639	460	420	359	297	365	297	307	205	267
Non A, Non B	25	27	31	42	53	50	46	39	42	18	33	24	(Included in Hepatitis, Unspecified)		
Unspecified	19	9	15	19	13	21	21	15	24	46	87	95	214	176	189
Influenza (confirmed)	272	111	462	220	293	148	69	78	61	39	140	153	225	-	-
Lyme Disease	108	150	207	205	108	-	-	-	-	-	-	-	-	-	-
Malaria	9	12	9	13	13	6	8	12	5	8	4	10	4	16	6
Meningitis, Asep.	275	272	277	246	223	124	163	172	156	95	277	156	178	116	130
Meningitis, Mening.	34	32	37	31	21	33	35	40	46	53	55	40	45	42	38
Meningitis, Other	78	43	62	66	64	64	75	123	47	51	276	156	122	127	94
Mumps	46	39	40	62	87	68	38	23	18	11	21	13	40	103	203
Pertussis	144	120	83	116	141	25	46	32	35	23	24	17	24	30	24
Polio, all forms	0	0	0	0	0	1	0	0	1	0	2	0	1	0	1
Rabies, Animal	35	37	28	30	62	36	59	75	59	70	96	123	243	379	307
RMSF	20	24	25	36	48	54	26	25	10	14	14	10	23	31	31
Rubella	1	1	5	3	4	0	0	1	7	0	0	38	2	45	73
Rubeola	1	0	1	103	671	65	190	32	5	6	1	2	1	67	436
Salmonellosis	529	426	616	723	676	772	660	728	690	617	602	571	700	589	602
Shigellosis	674	742	259	284	411	607	471	89	143	244	264	67	268	129	258
Syphilis, Total	2499	1940	926	598	388	473	328	494	578	712	801	1069	1397	1051	896
Primary & Second.	1354	1167	572	272	162	154	90	110	133	186	145	296	394	163	139
Tetanus	1	1	1	0	4	1	1	2	3	6	1	1	1	2	1
Tuberculosis	256	245	254	312	278	275	339	338	311	354	399	390	432	466	500
Tularemia	17	34	44	33	39	45	58	32	35	40	51	27	28	26	21
Typhoid Fever	2	3	2	4	2	3	7	6	6	6	10	4	9	20	8
Yersinia enterocolitica	26	37	48	32	36	30	10	6	2	3	1	-	-	-	-

Diseases of the Gastrointestinal Tract

Campylobacteriosis (*Campylobacter enteritis*)

Campylobacteriosis is an acute enteric disease of bacterial origin. The disease is characterized by bloody and mucoid diarrhea, abdominal cramps, fever, nausea and vomiting. The primary mode of transmission for this disease is through consumption of inadequately cooked foods of animal origin, including poultry, beef, pork and unpasteurized milk. This disease can be acquired by individuals such as veterinarians, farmers, and food processing workers, who are exposed to animals and animal products.

In Missouri, there were 614 cases of campylobacteriosis in 1992 and 616 cases in 1993. The number of cases has increased annually since 1987. See Figure 1. The highest incidence occurred in those less than five years of age, with incidence rates of 21.6 per 100,000 in 1992 and 29.9 per 100,000 in 1993. See Figure 2. The geographic distribution of campylobacteriosis by Department of Health districts is shown in Figure 3; the Southwestern health district has had the highest rate in three of the last four years. Figure 4 shows the rates by county in 1993. Among the reported cases, 255 (20.7%) were hospitalized and there were no deaths reported.

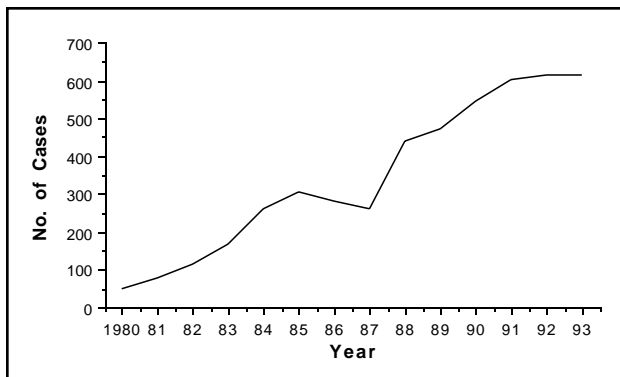


Figure 1. Campylobacteriosis cases by year, Missouri, 1980-93

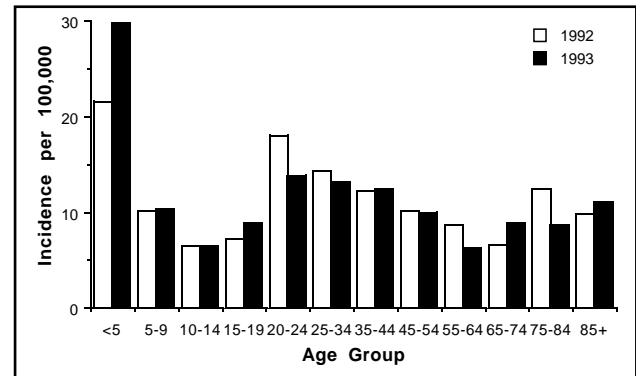


Figure 2. Campylobacteriosis incidence by age group, Missouri, 1992-93

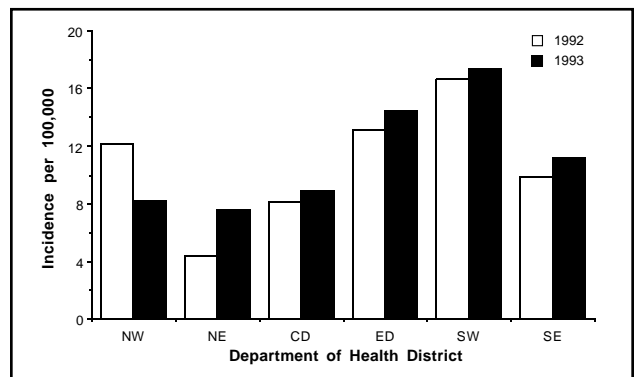


Figure 3. Campylobacteriosis incidence by health district, Missouri, 1992-93

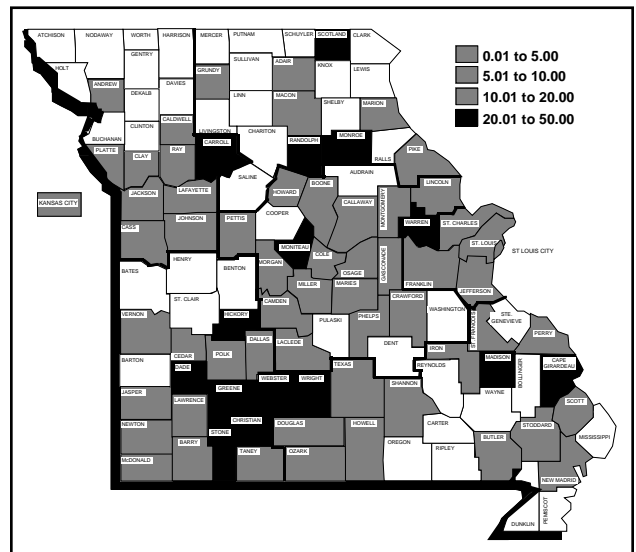


Figure 4. Campylobacteriosis incidence per 100,000 by county, Missouri, 1993

***Escherichia coli* O157:H7**

Since its identification as a cause of human illness in 1982, *Escherichia coli* O157:H7 has emerged as an important cause of diarrheal illness in the United States. It is also the most common cause of hemolytic uremic syndrome (HUS), an illness characterized by acute renal failure, anemia and low platelet count. The typical symptoms of *E. coli* O157:H7 infection are abdominal cramps and bloody diarrhea, with little or no fever. Some patients have nonbloody diarrhea; in others, the bleeding is profuse.

Cattle can be colonized with *E. coli* O157:H7, and most outbreaks of the disease have been caused by ground beef and raw milk. Other vehicles detected in outbreaks have included unchlorinated municipal water, swimming water, apple cider and various foods cross-contaminated by raw beef. The illness is transmitted easily between family members and in child care centers.

Routine stool culture methods do not detect *E. coli* O157:H7, so its true incidence is not known. The disease was made reportable in Missouri in mid-1992.

A total of 35 cases was reported in 1993. The highest incidence occurred in the 75-84 year age group, with a rate of 1.7 per 100,000. Children under five had a rate of 1.3 per 100,000. See Figure 1. The Eastern health district had the highest incidence rate, with 1.1 cases per 100,000. See Figure 2. Twenty (57%) of the cases were hospitalized and there were no deaths reported.

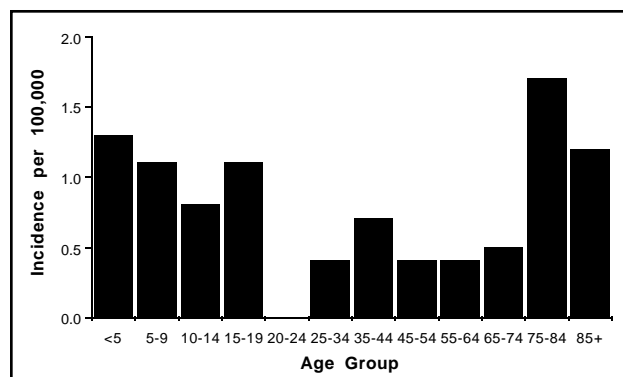


Figure 1. *E. coli* O157:H7 incidence by age group, Missouri, 1993

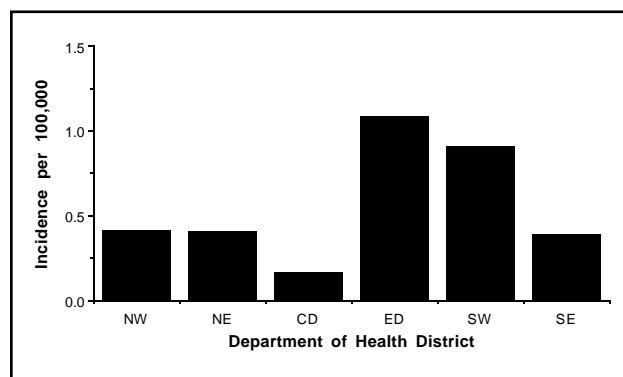


Figure 2. *E. coli* O157:H7 incidence by health district, Missouri, 1993

Giardiasis (*Giardia enteritis*)

Giardiasis is usually a mild intestinal disease caused by a protozoan flagellate, *Giardia lamblia*. This protozoan infects the upper small intestine and usually does not produce symptoms. It is sometimes associated with symptoms such as chronic diarrhea, abdominal cramps, bloating, steatorrhea, fatigue and weight loss. The parasite can be passed from person to person by the fecal-oral route or through contaminated food and water.

In Missouri, there were 739 cases of giardiasis reported in 1992 and 770 cases in 1993. The number of cases reported annually increased relatively steadily from the time giardiasis became reportable in 1979 until 1990, and has declined slightly since then. See Figure 1. Presently, this disease affects primarily the younger population. The highest incidence occurred in those less than five years of age, with incidence rates of 56.3 per 100,000 in 1992 and 54.7 per 100,000 in 1993. See Figure 2. The geographic distribution by Department of Health districts in Missouri is shown in Figure 3. Figure 4 shows the rates by county in 1993.

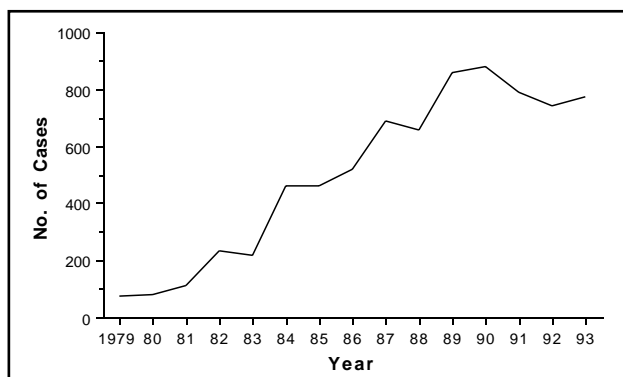


Figure 1. Giardiasis cases by year, Missouri, 1979-93

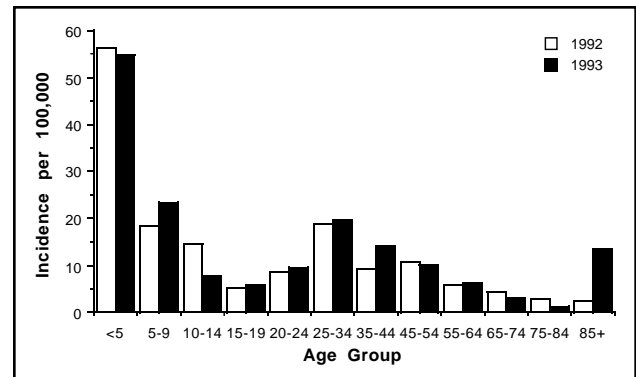


Figure 2. Giardiasis incidence by age group, Missouri, 1992-93

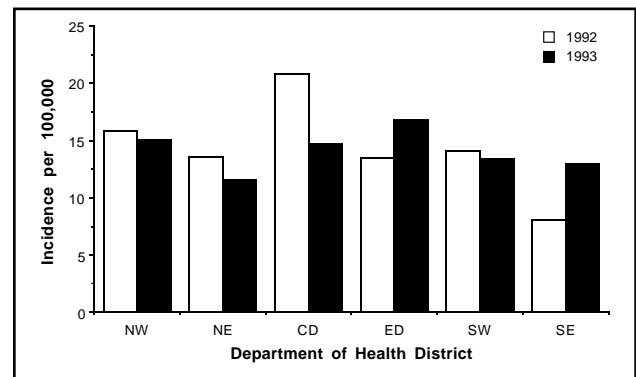


Figure 3. Giardiasis incidence by health district, Missouri, 1992-93

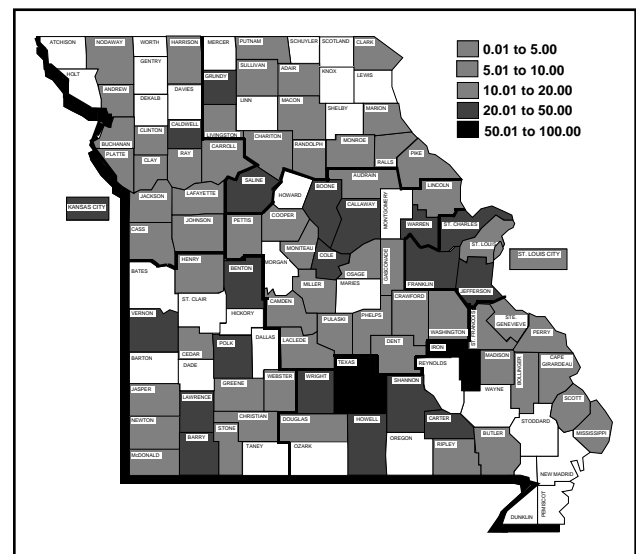


Figure 4. Giardiasis incidence per 100,000 by county, Missouri, 1993

Salmonellosis

Salmonellosis is a bacterial infection that can be caused by a variety of *Salmonella* organisms. The genus *Salmonellae* includes over 2,000 serotypes. Each serotype has its own antigenic composition and usual host range. Salmonellosis manifests with the following symptoms: acute enterocolitis, abdominal pain, diarrhea, vomiting, nausea and anorexia. Symptoms may be mild and infections may occur without symptoms. Deaths associated with salmonellosis are rare, but the morbidity and the associated costs of this disease are high. There is regional variation in the prevalence of the different serotypes; *S. enteritidis* and *S. typhimurium* are the two most commonly reported serotypes in the United States and Missouri.

Transmission of *Salmonella* organisms occurs through infected food animals or fecal contamination of food. Common sources include poultry, meat and meat products, raw and undercooked eggs and egg products, raw milk and raw milk products, as well as pet turtles and chicks and unsterilized pharmaceuticals of animal origin.

In Missouri, there were 426 cases of salmonellosis reported in 1992 and 529 cases in 1993. These are the lowest levels recorded in the past 15 years. See Figure 1. Children less than five years of age had

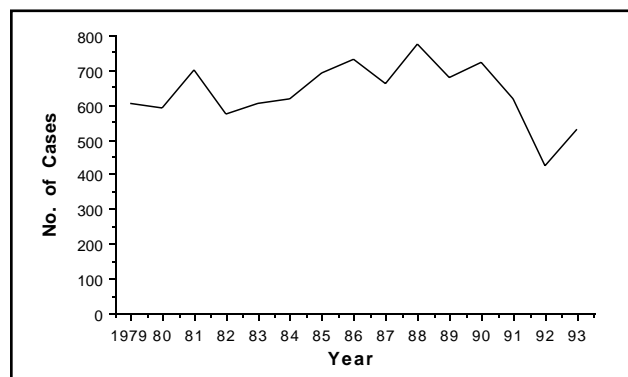


Figure 1. Salmonellosis cases by year, Missouri, 1979-93

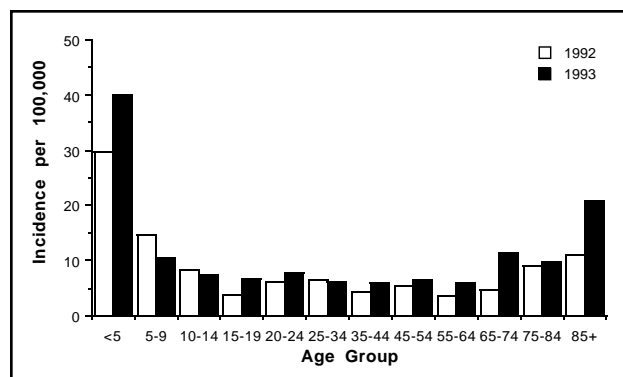


Figure 2. Salmonellosis incidence by age group, Missouri, 1992-93

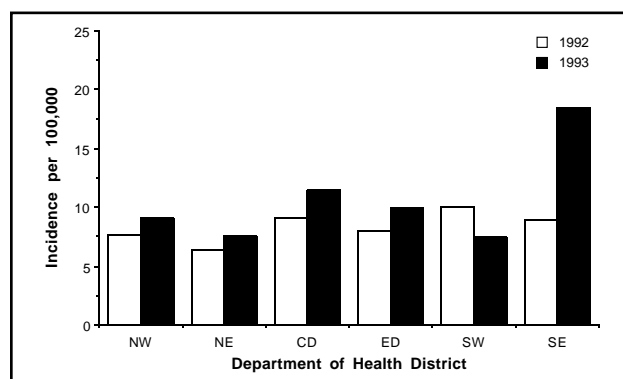


Figure 3. Salmonellosis incidence by health district, Missouri, 1992-93

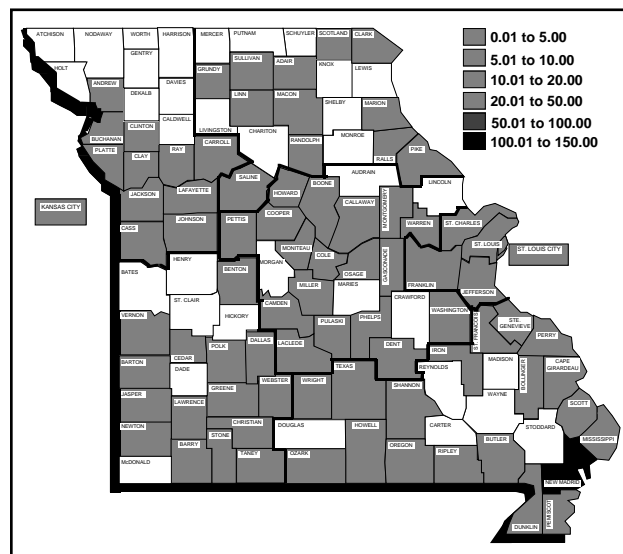


Figure 4. Salmonellosis incidence per 100,000 by county, Missouri, 1993

the highest rate of *Salmonella* infection, with incidence rates of 29.6 per 100,000 in 1992 and 40.0 per 100,000 in 1993. See Figure 2. The Southwestern health district had the highest incidence in 1992 with a rate of 10.0 per 100,000. The Southeastern health district had the highest incidence in 1993 with a rate of 18.4 per 100,000, mainly due to an outbreak of *Salmonella typhimurium*. See Figure 3. Figure 4 shows the rates by county in 1993. The most common serotypes isolated in Missouri in 1992–93 are shown in Figure 5. Among the reported cases, 279 (29.2%) were hospitalized and there were five deaths for a case fatality rate of 5.2 per 1,000.

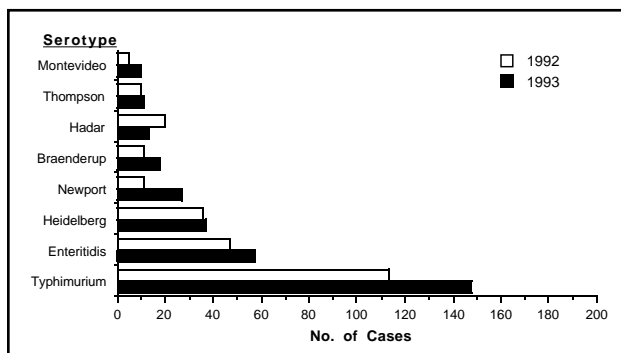


Figure 5. Leading *Salmonella* serotypes in Missouri, 1992–93

Shigellosis (Bacillary dysentery)

Shigellosis is a bacterial enteric disease transmitted among humans. The disease causes diarrhea, fever, vomiting, nausea and abdominal cramps. There may be mild and even asymptomatic cases. The usual means of transmission is by direct or indirect fecal-oral contamination from an infected person. Poor hygienic practices such as failure to wash hands and clean under fingernails following defecation are a major factor in transmission. The disease is more severe in children, elderly adults and debilitated individuals.

The number of cases of shigellosis in Missouri reached the highest level in the past 15 years in 1992, with 742 cases, and moderated only slightly in 1993 with 674 cases. See Figure 1. The highest incidence occurred in those less than five years of age, with incidence rates of 80.5 per 100,000 in 1992 and 69.9 per 100,000 in 1993. See Figure 2. The Eastern health district had the highest incidence in both years, with rates of 27.8 per 100,000 in 1992 and 23.2 per 100,000 in 1993. See Figure 3. Figure 4 shows the rates by county in 1993. Among the reported cases, 196 (13.8%) were hospitalized. Two deaths occurred, for a case fatality rate of 1.4 per 1,000.

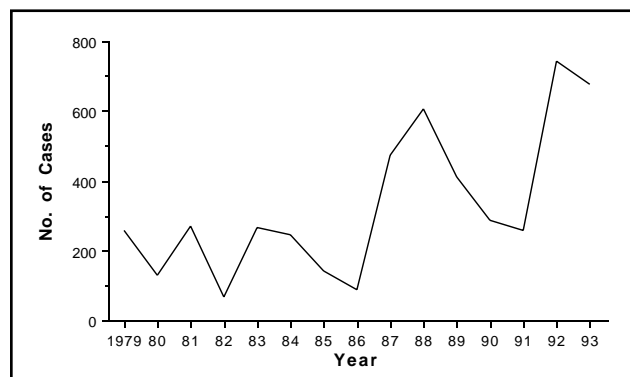


Figure 1. Shigellosis cases by year, Missouri, 1979-93

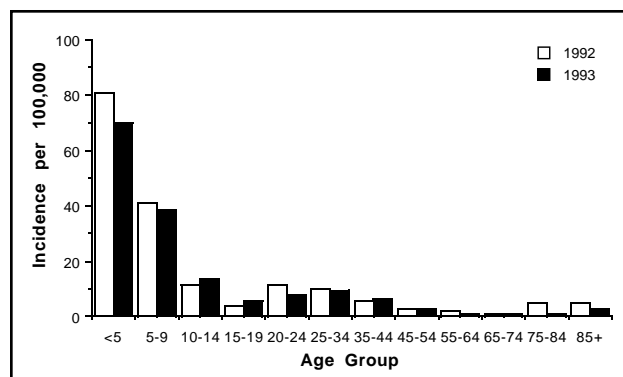


Figure 2. Shigellosis incidence by age group, Missouri, 1992-93

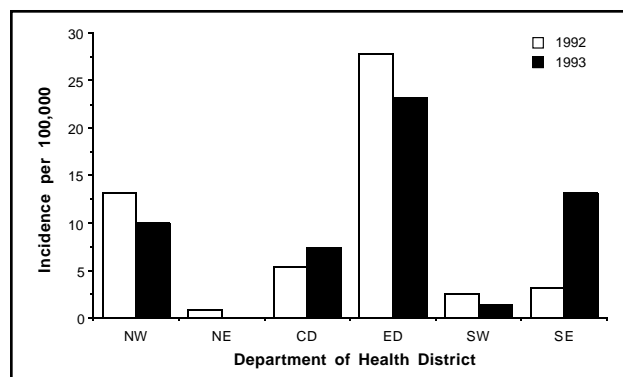


Figure 3. Shigellosis incidence by health district, Missouri, 1992-93 Shigello-

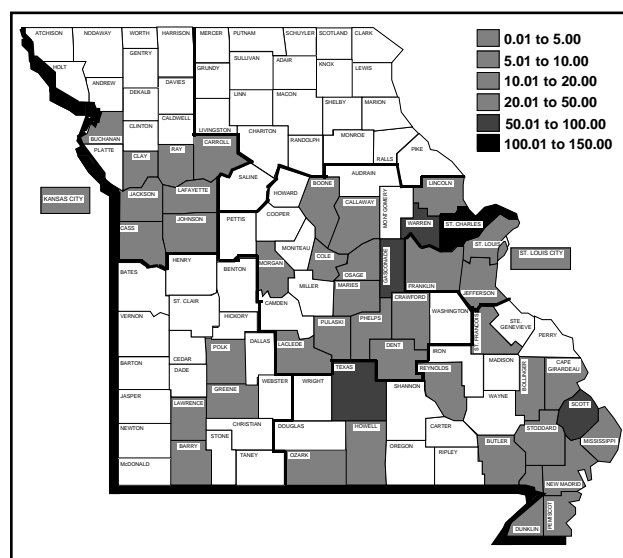


Figure 4. Shigellosis incidence per 100,000 by county, Missouri, 1993

There are four species of *Shigella* with many serotypes. Table 1 shows the isolates identified in Missouri by species.

Table 1. <i>Shigella</i> species in Missouri, 1992–93		
<u>Serotype</u>	<u>1992</u>	<u>1993</u>
<i>S. sonnei</i>	400 (84.0%)	491 (72.8%)
<i>S. flexneri</i>	10 (2.1%)	8 (1.2%)
<i>S. dysenteriae</i>	9 (1.9%)	11 (1.6%)
<i>S. boydii</i>	2 (0.4%)	0
Unspecified	55 (11.5%)	164 (24.4%)

Yersiniosis (*Yersinia enterocolitica*)

Yersiniosis is an acute bacterial enteric disease manifested by the following signs and symptoms: acute watery diarrhea (especially in young children), enterocolitis, fever and vomiting. Less common symptoms include erythema nodosum, cutaneous ulcerations, osteomyelitis and septicemia. The *Yersinia* genus includes *Y. pestis*, the agent of plague, and numerous others, most of which are not pathogenic.

Yersinia enterocolitica is reportable in Missouri and presents most commonly with a gastro-enterocolitis syndrome. There are over 50 serotypes and five biotypes of *Y. enterocolitica*, many of which are non-pathogenic.

The pig is the principal reservoir of pathogenic *Y. enterocolitica*. Fecal-oral transmission occurs when contaminated food and drinks are consumed or contact occurs with an infected person or animal. Although *Y. enterocolitica* has been isolated from a variety of foods, the pathogenic strains are most commonly isolated from raw pork products. It is able to grow and multiply in refrigerated and microaerophilic conditions, so there is an increased risk of infection if uncured meat is stored undercooked.

In Missouri, the number of reported cases of yersiniosis decreased during the past two years, with 37 cases reported in 1992 and 26 cases in 1993. See Figure 1. The highest incidence occurred in those under five years of age, with incidence rates of 4.3 per 100,000 in 1992 and 4.8 per 100,000 in 1993. See Figure 2. The Eastern health district, which includes St. Louis, had the highest incidence in both years, with a rate of 1.1 per 100,000 in 1992 and 0.8 per 100,000 in 1993. See Figure 3. A high proportion of the cases were African-American (48.6 percent in 1992 and 50

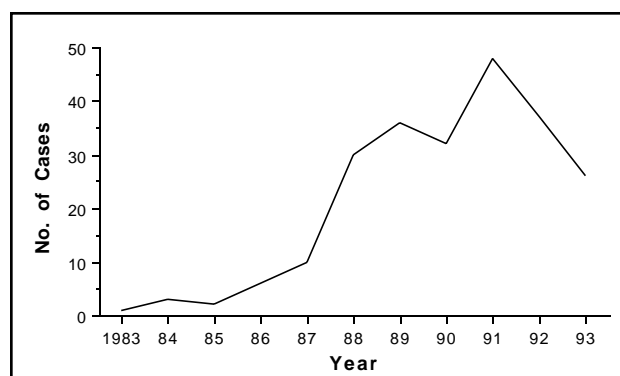


Figure 1. Yersiniosis cases by year, Missouri, 1983-93

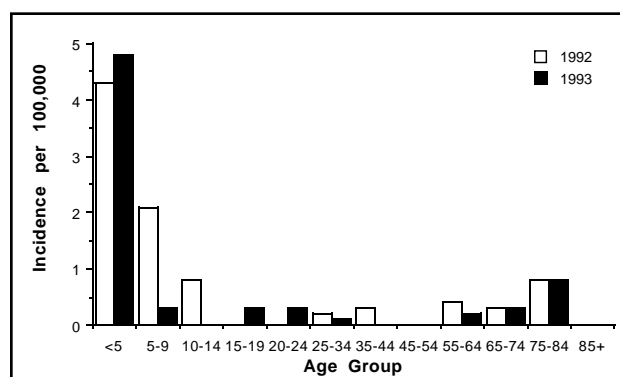


Figure 2. Yersiniosis incidence by age group, Missouri, 1992-93

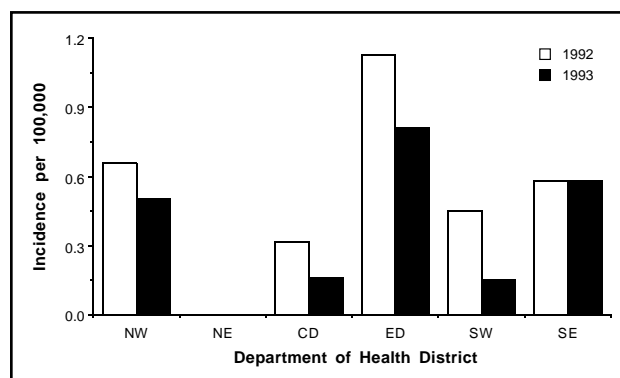


Figure 3. Yersiniosis incidence by health district, Missouri, 1992-93

percent in 1993). Among the reported cases, 20 (31.7%) were hospitalized and there was one death for a case fatality rate of 15.9 per 1,000.

Diseases of the Nervous System

Aseptic Meningitis (Viral meningitis, non-bacterial meningitis)

This is a common disease syndrome with multiple etiologies of viral origin. The disease is characterized by the sudden onset of fever with signs of meningeal involvement, and laboratory findings of pleocytosis, increased levels of protein, normal sugar and the absence of bacteria in the cerebrospinal fluid.

In the United States, the majority of cases of aseptic meningitis is caused by enteroviruses (picornavirus). The incidence of specific types of viruses varies with geographic location and time.

In Missouri, the number of cases of aseptic meningitis has been stable over the past three years, with 272 cases reported in 1992 and 275 cases in 1993. See Figure 1. The highest incidence occurred in those less than five years of age, with incidence rates of 12.5 per 100,000 in 1992 and 16.3 per 100,000 in 1993. See Figure 2. The Southwestern health district had the highest incidence, with incidence rates of 8.2 per 100,000 in 1992 and 7.2 per 100,000 in 1993. See Figure 3. Figure 4 shows the rates by county in 1993. Among the reported cases, 506 (92.5%) were hospitalized and there were three deaths for a case fatality rate of 5.5 per 1,000.

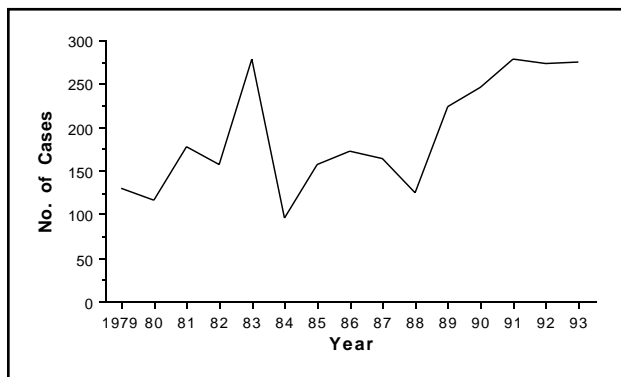


Figure 1. Aseptic meningitis cases by year, Missouri, 1979-93

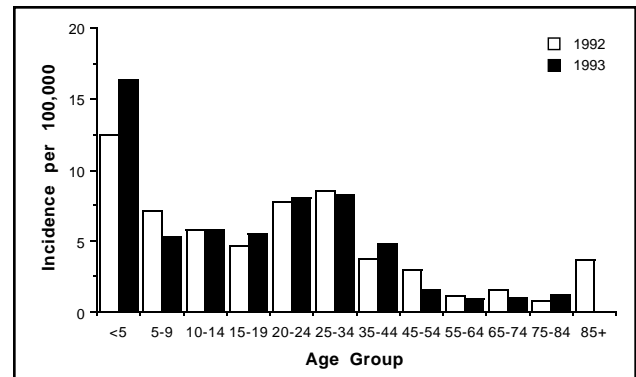


Figure 2. Aseptic meningitis incidence by age group, Missouri, 1992-93

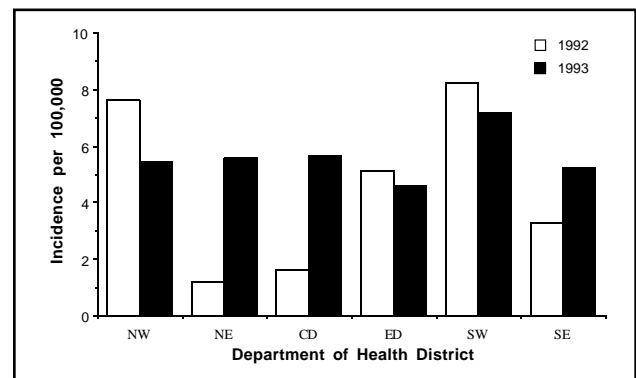


Figure 3. Aseptic meningitis incidence by health district, Missouri, 1992-93

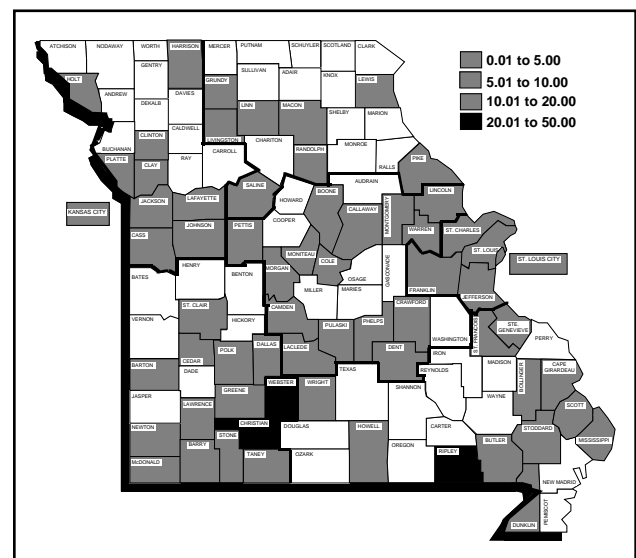


Figure 4. Aseptic meningitis incidence per 100,000 by county, Missouri, 1993

Meningococcal Meningitis

Meningococcal meningitis is an acute bacterial disease characterized by sudden onset of fever, severe headaches, nausea and vomiting, stiff neck, petechial rash, delirium and coma.

The infectious agent is *Neisseria meningitidis*. Asymptomatic carriage of this organism is relatively common. Transmission of the organism occurs by direct contact, including respiratory droplets from the nose and throat. The incubation period is usually two to ten days. Susceptibility to this disease decreases with age. Individuals lacking certain complement components are at risk to contract or have recurrence of this disease.

In Missouri, there were 32 cases of meningococcal meningitis reported in 1992, and 34 cases reported in 1993. The trend for this disease has been variable over the past 15 years with an average of 38 cases per year being reported in the state. See Figure 1.

The highest incidence occurred in those less than five years of age, with incidence rates of 2.7 per 100,000 in 1992 and 5.6 per 100,000 in 1993. See Figure 2. The Southeastern health district had the highest incidence in both years, with rates of 1.0 per 100,000 in 1992 and 1.4 per 100,000 in 1993. See Figure 3. Figure 4 shows the rates by county in 1993. Among the reported cases, 60 (90.9%) were

hospitalized and there were five deaths for a case fatality rate of 75.8 per 1,000.

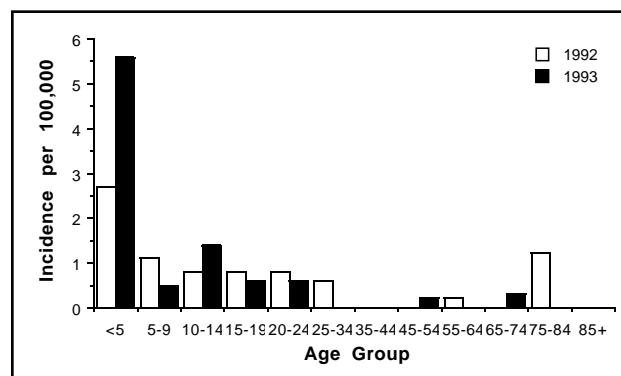


Figure 2. Meningococcal meningitis incidence by age group, Missouri, 1992-93

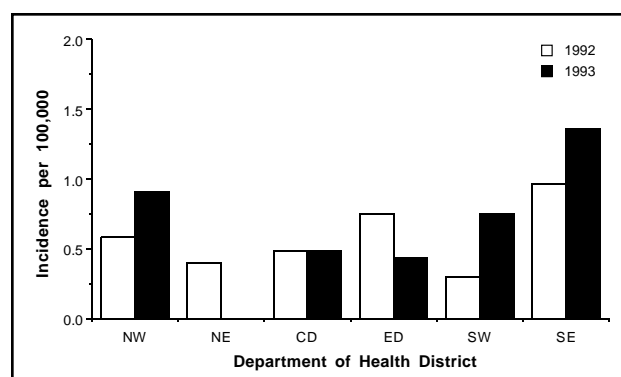


Figure 3. Meningococcal meningitis incidence by health district, Missouri, 1992-93

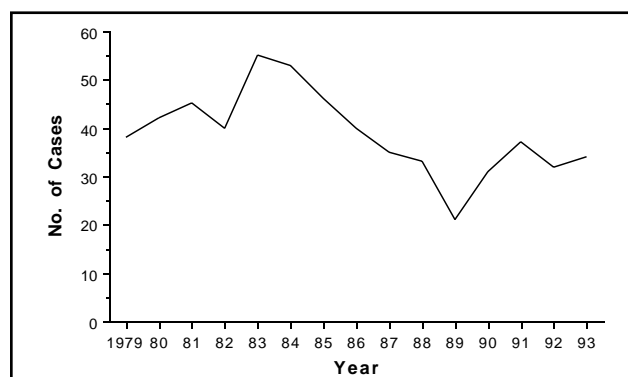


Figure 1. Meningococcal meningitis cases by year, Missouri, 1979-93

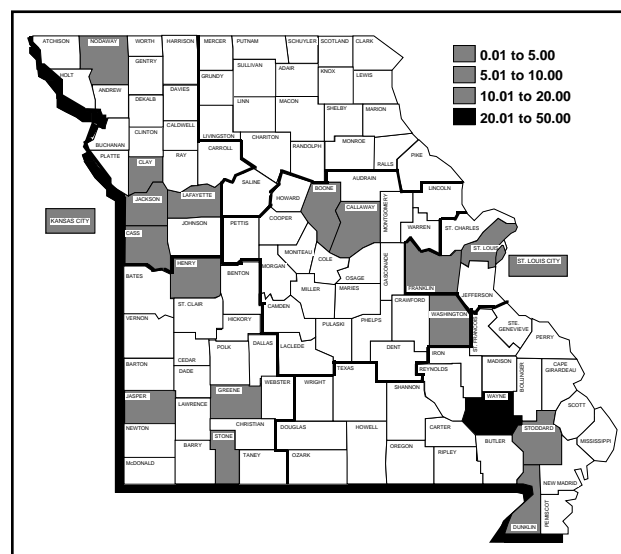


Figure 4. Meningococcal meningitis incidence per 100,000 by county, Missouri, 1993

Hepatitis

Viral Hepatitis

Viral hepatitis is a collective term used to describe inflammation of the liver resulting from viral infection. Presently, there are four different types of viral hepatitis recognized in the United States: A, B, C and D. Although the symptoms of hepatitis are similar, they differ in etiology and in immunologic, pathologic and epidemiologic characteristics.

Viral Hepatitis A

(Infectious Hepatitis, Epidemic Hepatitis, Epidemic Jaundice, Type A Hepatitis, HAV)

Of all the forms of viral hepatitis present in the United States, hepatitis A is the only one transmitted by the fecal-oral route. The infectious agent is found in stool, reaching peak levels one to two weeks prior to the onset of symptoms. Infectivity declines when symptoms of liver dysfunction appear (i.e., jaundice). The usual mode of transmission is through direct contact with an infected person, including sexual contact. Common-source outbreaks have been attributed to contaminated water, food contaminated by infected food-handlers and raw or uncooked shellfish harvested from contaminated waters. The incubation period is approximately two to seven weeks.

Symptoms include fever, malaise, anorexia, nausea, abdominal discomfort and jaundice. The disease varies in severity from mild illness lasting one to two weeks to a severe and disabling illness lasting several months. Asymptomatic infection is common and is inversely related to age.

In 1992, there were 1,500 cases of hepatitis A, an incidence rate of 29.3 per 100,000, the highest ever reported in Missouri. In 1993, the number decreased slightly to 1,443 cases, a rate of 28.2 per 100,000. See Figure 1. The highest incidence occurred in the 20-24 year age group, with incidence rates of 67.1 per 100,00 in 1992 and 65.2 per

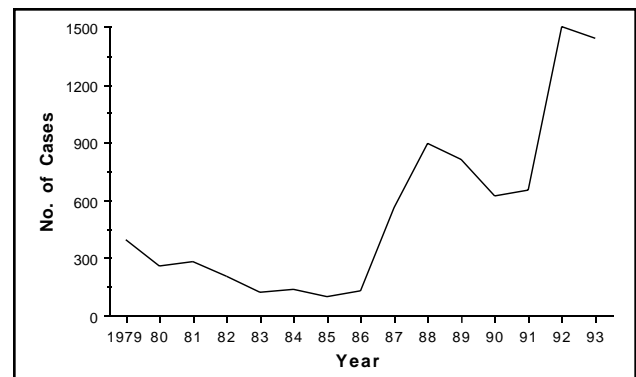


Figure 1. Hepatitis A cases by year, Missouri, 1979-93

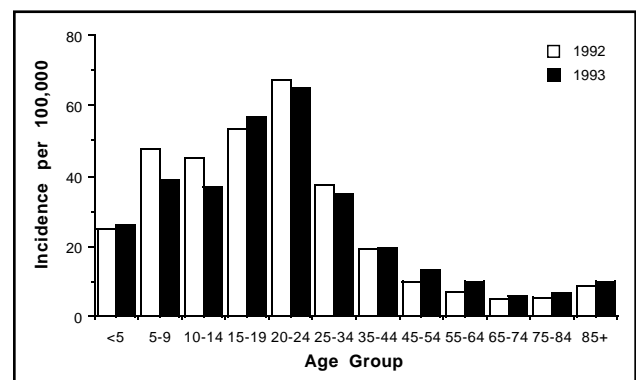


Figure 2. Hepatitis A incidence by age group, Missouri, 1992-93

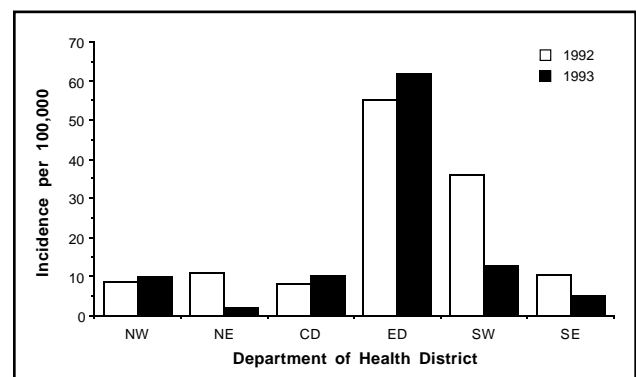


Figure 3. Hepatitis A incidence by health district, Missouri, 1992-93

100,000 in 1993. See Figure 2. The Eastern health district had the highest incidence rates during both years, with 55.2 per 100,000 in 1992 and 61.7 per 100,000 in 1993. See Figure 3. This reflects a community-based outbreak centered in St. Louis City and County during this time period. Figure 4

shows the rates by county in 1993. Among the reported cases, 414 (14.1%) were hospitalized and there were four deaths for a case fatality rate of 1.4 per 1,000.

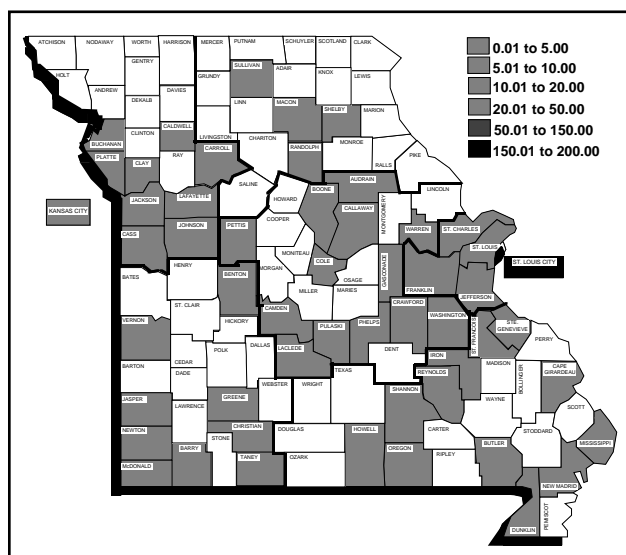


Figure 4. Hepatitis A incidence per 100,000 by county, Missouri, 1993

Viral Hepatitis B (Type B Hepatitis, Serum Hepatitis, HBV)

Hepatitis B is the most common form of bloodborne hepatitis. The virus is transmitted via direct contact with infectious blood and body fluids. The hepatitis B antigen is found in virtually all body secretions and excretions, however, only blood, saliva, semen and vaginal fluids have been shown to be infectious. Infection can occur through sexual contact, IV drug use, occupational exposure in healthcare settings, perinatal exposure and household contact with a carrier.

In Missouri, there were 535 acute cases of hepatitis B reported in 1992 and 585 acute cases reported in 1993, the first increase recorded since 1989. See Figure 1. The highest incidence occurred in the 20–24 year age group in 1992, with an incidence rate of 22.2 per 100,000. In 1993, the highest incidence was in the 25–34 year age group, with a rate of 22.3 per 100,000. See Figure 2. The Eastern health district had the highest incidence with rates of 16.2 per 100,000 in 1992 and 21.5 per 100,000 in 1993. See Figure 3. Figure 4 shows the rates by county in 1993. Among the reported cases, 166 (14.8%) were hospitalized and there were eleven deaths for a case fatality rate of 9.8 per 1,000.



Figure 1. Hepatitis B cases by year, Missouri, 1979–93

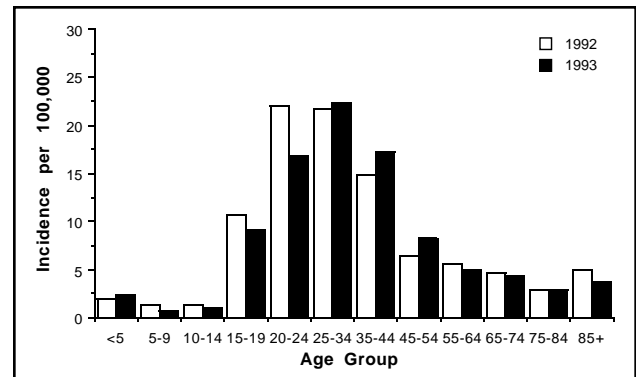


Figure 2. Hepatitis B incidence by age group, Missouri, 1992–93

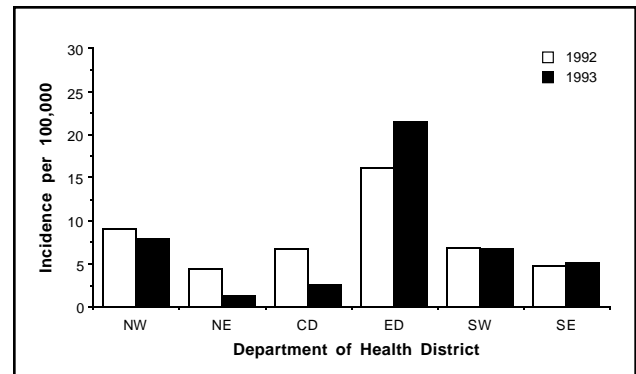


Figure 3. Hepatitis B incidence by health district, Missouri, 1992–93

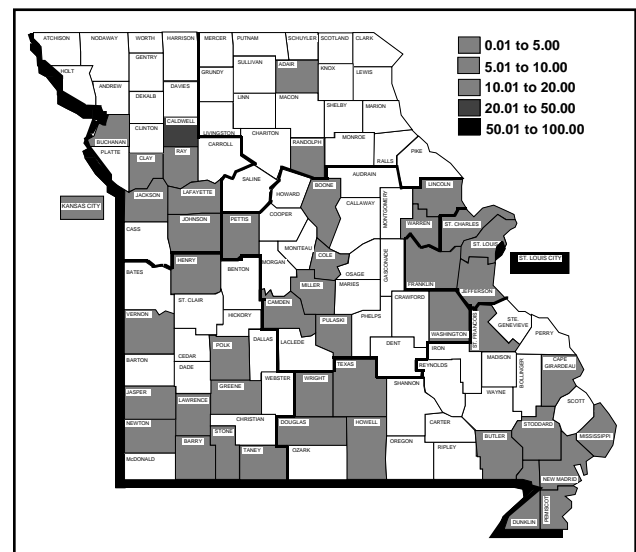


Figure 4. Hepatitis B incidence per 100,000 by county, Missouri, 1993

Non-A Non-B Hepatitis (NANB)

Non-A Non-B (NANB) hepatitis is a diagnosis of exclusion. Most NANB hepatitis in the United States is probably caused by the recently described hepatitis C virus; an unknown proportion may be due to other agents. NANB hepatitis includes both transfusion-associated disease, 90 percent of which is caused by the hepatitis C virus, and community-acquired disease. The newly developed serologic tests for hepatitis C antibodies are not helpful in diagnosing acute disease because there is a prolonged interval between disease onset and detection of antibodies. The diagnosis of acute NANB hepatitis, therefore, still relies on testing to rule out hepatitis A and B.

In Missouri, there were 27 cases of acute NANB hepatitis reported in 1992 and 25 cases reported in 1993. See Figure 1. The highest incidence occurred in the 25-34 year group in 1992, with an incidence rate of 1.3 per 100,000. In 1993, the highest incidence occurred in the 25-34 and 35-44 year age groups, with an incidence rate of 1.2 per 100,000. See Figure 2. The geographic distribution by health district is shown in Figure 3. Figure 4 shows the rates by county in 1993. Among the reported cases, 20 (38.5%) were hospitalized and there was one death for a case fatality rate of 19.2 per 1,000.

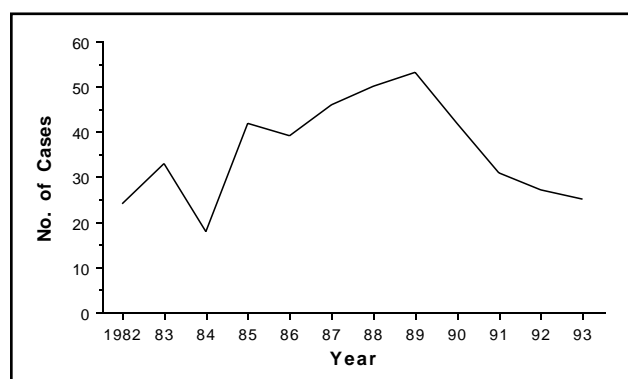


Figure 1. Hepatitis Non-A Non-B cases by year, Missouri, 1982-93

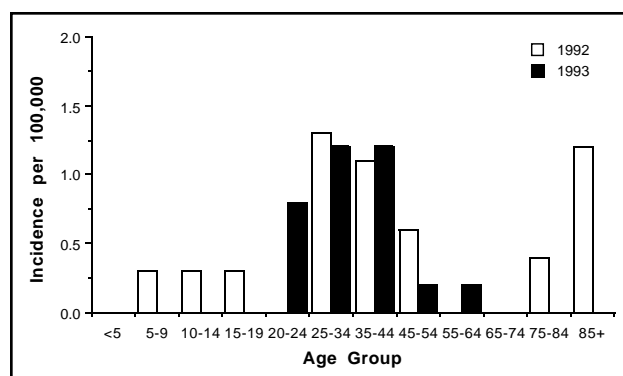


Figure 2. Hepatitis Non-A Non-B incidence by age group, Missouri, 1992-93

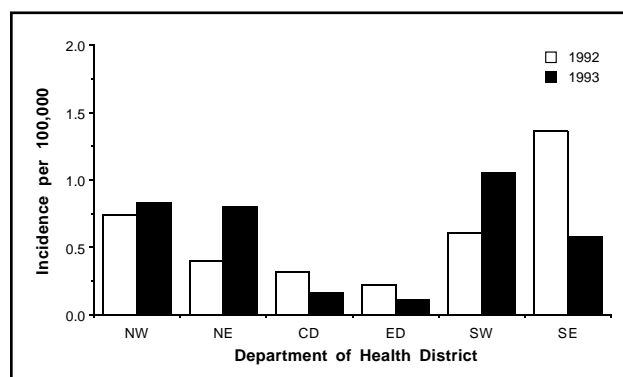


Figure 3. Hepatitis Non-A Non-B incidence by health district, Missouri, 1992-93

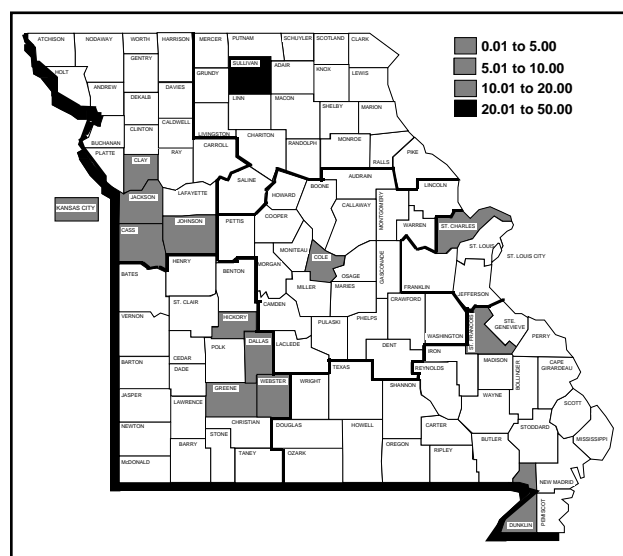


Figure 4. Hepatitis Non-A Non-B incidence per 100,000 by county, Missouri, 1993

Immunizable Diseases

Diphtheria

Diphtheria is an acute bacterial disease of the tonsils, pharynx, larynx and nose, occasionally of other mucous membranes or skin, and sometimes the conjunctivae or genitalia. The characteristic lesion, caused by the release of a specific cytotoxin, is an adherent grayish membrane with a surrounding inflammation.

The infectious agent is *Corynebacterium diphtheriae*, which produces the cytotoxin. A disease of colder months in temperate zones, it involves primarily older children under 15 years of age, but is also found among adult populations in which immunization was neglected. Formerly a common disease, it has largely disappeared in areas where effective immunization programs have been carried out. The disease is transmitted from person to person through droplets from the respiratory system and through contact with the lesion or articles contaminated with the discharges from cases or carriers.

In Missouri, there have been no reported cases since 1979.

***Haemophilus influenzae*, type B (Hib)**

Haemophilus influenzae is a leading cause of serious systemic bacterial disease in the United States. It has been the most common cause of bacterial meningitis, accounting for an estimated 8,000–11,000 cases annually until the early 1990s. It occurs primarily among children less than five years of age. The mortality rate is two to eight percent even with currently available antimicrobial therapy, and neurologic sequelae are observed in as many as 15–45 percent of survivors. Almost all cases of *H. influenzae* meningitis among children are caused by strains of type b (Hib). Symptoms of the Hib meningitis syndrome may include the following: fever, vomiting, lethargy and meningeal irritation in infants and stiff neck and back in older children. Progressive stupor or coma is common and occasionally there is low-grade fever with central nervous system involvement.

In addition to bacterial meningitis, Hib is responsible for other invasive diseases, including epiglottitis, sepsis, cellulitis, septic arthritis, osteomyelitis, pericarditis and pneumonia. Non-typable strains of *H. influenzae* colonize the human respiratory tract and are a major cause of otitis media and respiratory mucosal infection, but rarely result in bacteremic disease. Hib is spread by droplets and discharges from the nose and throat. Asymptomatic colonization is frequent; Hib can be isolated from the throats of two to five percent of children.

The incidence of Hib meningitis has decreased in Missouri since 1986 to a record low of 12 cases in 1993. See Figure 1. The development of effective vaccines for infants has significantly decreased Hib incidence in the youngest age groups. See Figure 2. Central health district had the highest incidence in 1992 with a rate of 0.7 per 100,000. The Northeastern health district had the highest incidence in 1993 with a rate of 1.2 per 100,000. See Figure 3. Among the 34 reported cases in

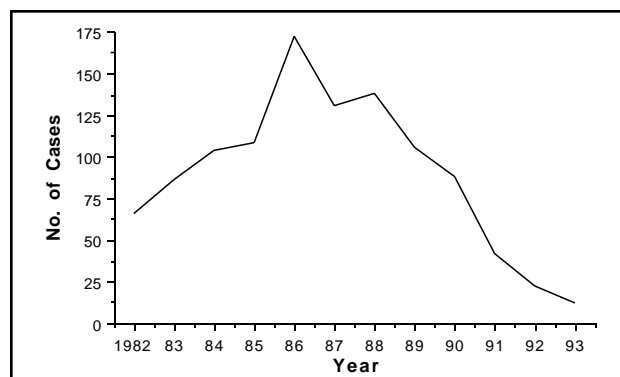


Figure 1. Hib meningitis cases by year, Missouri, 1982–93

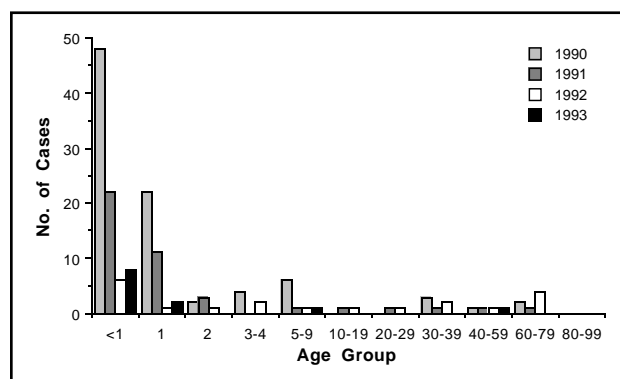


Figure 2. Hib meningitis cases by age group, Missouri, 1990–93

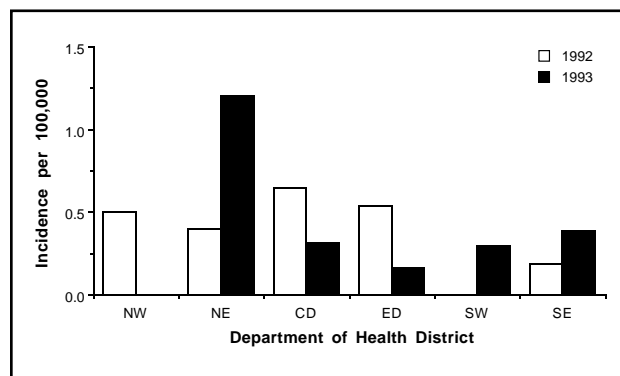


Figure 3. Hib meningitis incidence by health district, Missouri, 1992–93

1992–93, 30 (88%) were hospitalized and there were no deaths reported.

Invasive Hib disease other than meningitis became reportable in Missouri in 1990. There were 59 cases reported in 1992 and 123 in 1993. The increase is probably due to intensified surveillance activities.

Influenza

Influenza is an acute viral disease of the respiratory tract. Symptoms include sudden onset of fever, sore throat, muscle aches and a non-productive cough. Influenza is spread by direct contact with an infected person, or by airborne droplets. Persons are most infectious during the 24 hours before they develop symptoms and are usually infectious for seven days. The incubation period is usually one to three days.

Epidemics of influenza can rapidly evolve with widespread morbidity and serious complications, including viral and bacterial pneumonia. The mortality rate is usually higher in the elderly and those debilitated by chronic cardiac, pulmonary, renal or metabolic disease; anemia; or immunosuppression.

Most of the influenza activity in Missouri during the 1992-93 season was related to type B influenza. A total of 346 cases of influenza was laboratory confirmed. Of these, 288 (83%) were type B, with 75 subtyped as B/Panama-like; 58 (17%) were type A, with seven sub-typed as A (H1N1). The number of cases of influenza-like illness reported for the season was 78,338, considerably higher than the 69,699 reported during the 1991-92 season. Influenza-like illness incidence peaked in week six. See Figure 1. The total number of deaths for the season was 1,161, up slightly from the 1,143 reported during the 1991-92 season. Deaths peaked in week ten. See Figure 2. Outbreaks of influenza-like illness were verified in 29 schools. Absenteeism rates ranged from 13-54 percent and 25 schools were reported to be closed. Accumulated immunity to type B influenza in the adult population usually decreases the risk of severe illness from this strain. Conversely, children have had no chance to build immunity to type B and this may account for the increased flu activity in schools this season.

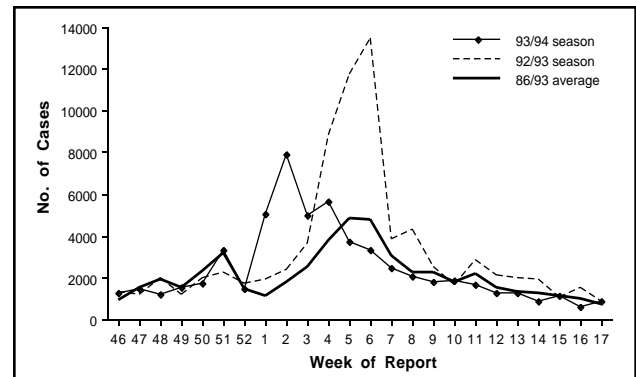


Figure 1. Influenza-like illness by week of report, Missouri, 1993-94, 1992-93 and 1986-93 average

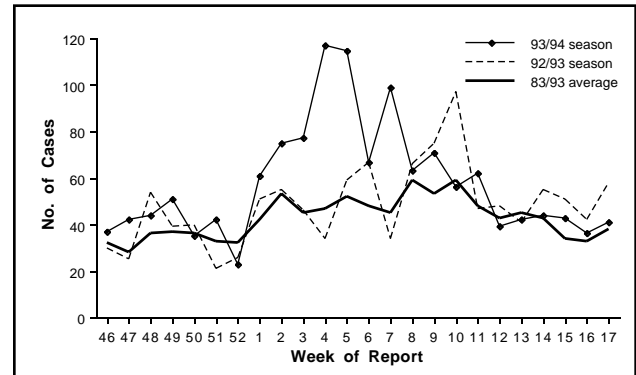


Figure 2. Pneumonia and influenza deaths by week of report, Missouri, 1993-94, 1992-93 and 1983-93 average

The first laboratory confirmed case of the 1993-94 influenza season was reported on November 23, 1993 in keeping with the Centers for Disease Control and Prevention's prediction of an earlier than usual flu season. A total of 283 laboratory confirmed cases of influenza was reported. All were type A with 53 subtyped as A/Beijing (H3N2); no cases of type B were reported. Reports of influenza-like illness peaked during week two. See Figure 1. Pneumonia and influenza deaths were above the previous 10 year average for most of the season and peaked during week four. See Figure 2. High mortality rates are not uncommon in seasons when A(H3N2) is the predominant strain. The Division of Health Resources reported

that pneumonia and influenza deaths replaced injuries as the fifth leading cause of deaths in Missouri during 1993.

The 1993-94 season was characterized by outbreaks of influenza-like illness in a variety of settings. Ten schools reported outbreaks, one of which was laboratory confirmed. Eight long-term care facilities reported outbreaks (four confirmed) with attack rates ranging from 20–57 percent, with many of the cases occurring in immunized individuals. Unconfirmed outbreaks were reported in a correctional facility and a state hospital.

Measles (Rubeola, Hard Measles, Red Measles, Morbilli)

Measles is an acute, highly communicable disease of viral origin. The disease is characterized by the following symptoms: fever, conjunctivitis, coughing and Koplik spots on the buccal mucosa. Frequently, other complications may result from either viral replication or bacterial superinfection; these include: otitis media (middle ear infection), bronchopneumonia, diarrhea and encephalitis.

In developed countries, one in every 1,000 reported cases results in death, primarily from respiratory and neurologic complications. Measles is more severe in the very young and in malnourished children. The case mortality rate may be five to ten percent or higher in these populations.

The mode of transmission is by airborne droplet spread, direct contact with nasal or throat secretions of infected persons and, less commonly, by articles freshly soiled with nose and throat secretions. Measles is one of the most highly communicable infectious diseases.

The incubation period is about ten days, varying from 7 to 18 days from exposure to onset of fever, usually 14 days until rash appears. All persons who have not had the disease or been successfully immunized are susceptible. Acquired immunity after disease is permanent. Infants born of mothers who have had the disease are immune for approximately the first six to nine months or more. Vaccination at age 15 months produces immunity in 95–98 percent of recipients; revaccination may produce immunity levels as high as 99 percent.

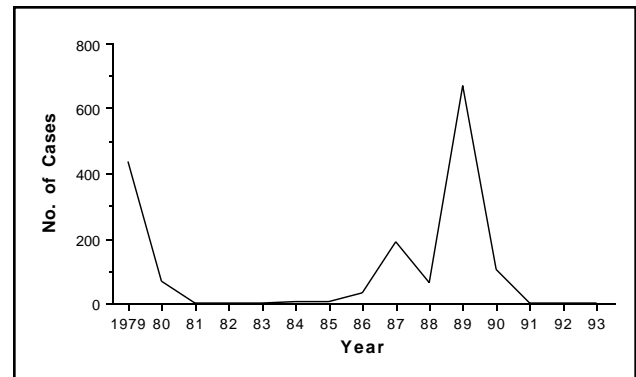


Figure 1. Measles cases by year, Missouri, 1979–93

Missouri experienced low incidence of measles in the years 1981–88, with an average of 30 cases reported per year. In 1989, there was a dramatic increase to 671 reported cases. There were no cases reported in 1992 and there was one case of measles in a 12-year-old child reported in 1993. See Figure 1.

A second dose of measles vaccine is required for school attendance for all children who started kindergarten as of or after the 1990-91 school year.

Mumps (Infectious parotitis)

Mumps is an acute viral disease characterized by swelling and tenderness of one or more of the salivary glands, usually the parotid and sometimes the sublingual or submaxillary glands. The central nervous system is frequently involved, usually as aseptic meningitis, almost always without sequelae. Other possible complications include encephalitis, orchitis, pancreatitis, neuritis, arthritis, mastitis, nephritis, thyroiditis and pericarditis. The mode of transmission is by droplet spread or direct contact with saliva of an infected person. The incubation period is about 12–25 days with an average of 18 days.

In Missouri, the 15 year trend shows that mumps incidence has been below 100 cases per year since 1981 with a peak of 87 cases occurring in 1987. There were 39 cases reported in 1992 and 46 in 1993. See Figure 1.

Serologic studies show that 85 percent or more of people have had mumps by the time they reach adulthood, in the absence of immunization. Inapparent infection is common, especially in children under two. Highest incidence is in winter and spring. The incidence of mumps has declined in the United States due to effective immunization. The risk of infection remains highest in children under age 15, but adolescents and adults through age 44 have experienced this illness. See Figure 2.

Figure 3 shows the incidence of mumps by health district for 1992–93.

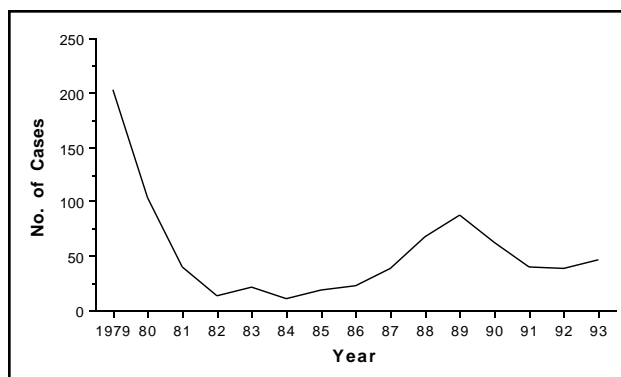


Figure 1. Mumps cases by year, Missouri, 1979–93

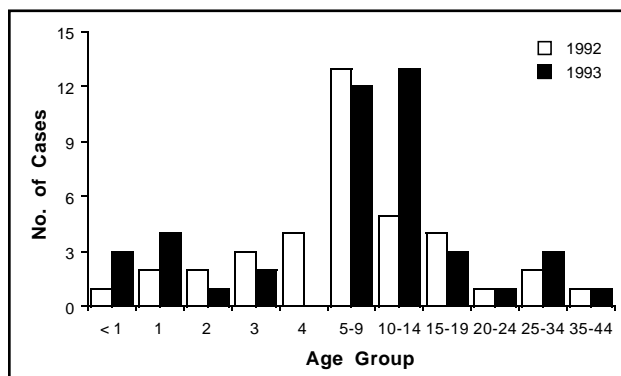


Figure 2. Mumps cases by age group, Missouri, 1992–93

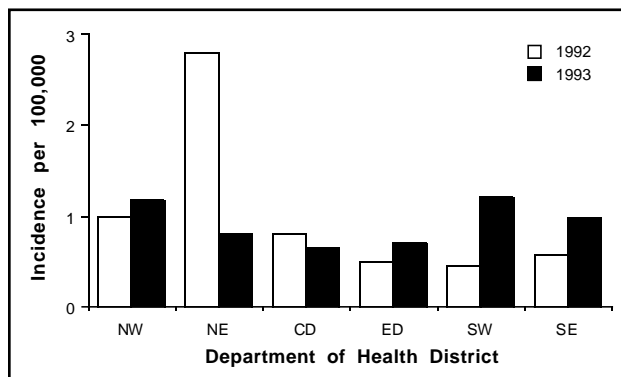


Figure 3. Mumps incidence by health district, Missouri, 1992–93

Pertussis (Whooping Cough)

Pertussis (whooping cough) is a highly contagious bacterial disease, involving the respiratory tract. Pertussis has an infection rate of up to 90 percent in non-immune household contacts. The disease is most often due to exposure to older siblings and adults with mild or atypical illness. During the first year of life, pertussis can be a particularly severe illness, with complications that include pneumonia, seizures and encephalopathy. More than 50 percent of children less than one year of age reported to have pertussis are hospitalized. In infants less than six months of age, the case fatality rate is approximately one percent.

In Missouri, the number of reported pertussis cases continued to rise in 1992–93. In 1992, 120 cases were reported, and in 1993, 144 cases were reported. See Figure 1. Over half of the cases were in infants 0–6 months of age. See Figure 2. As the graph shows, most of the cases occurred in unimmunized or underimmunized individuals. Of the reported cases, 55 percent occurred in the Kansas City and St. Louis metropolitan areas, and 45 percent were reported from thirty-three counties in the remaining five state health districts.

Figure 3 shows incidence of pertussis by health district for 1992–93.

The incidence of pertussis in the United States peaks every three to four years, however, the incidence in the nation was higher than expected in 1993 with over 5,900 reported cases.

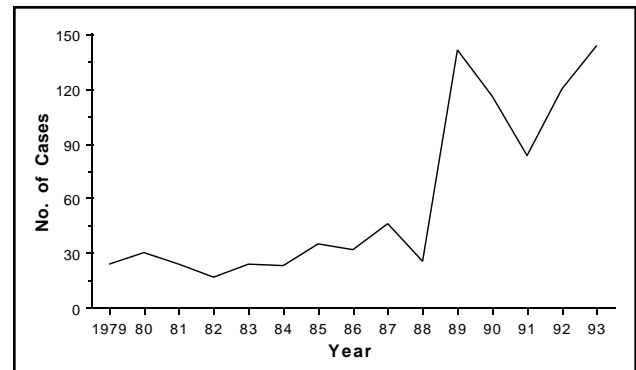


Figure 1. Pertussis cases by year, Missouri, 1979–93

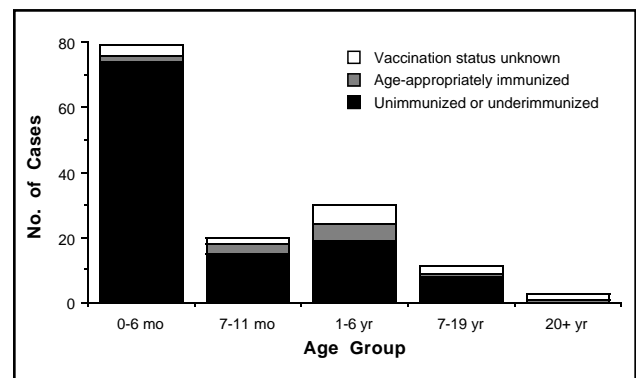


Figure 2. Pertussis cases by age group and vaccination status, Missouri, 1993

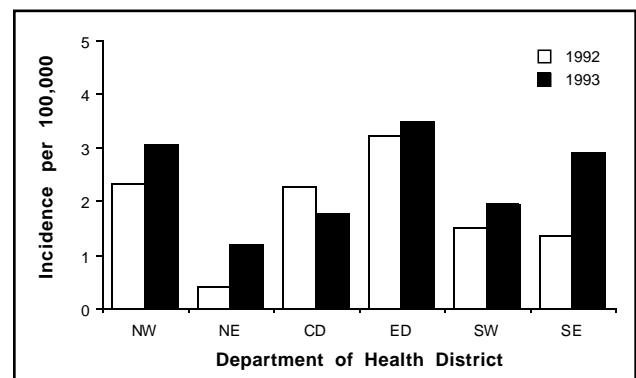


Figure 3. Pertussis incidence by health district, Missouri, 1992–93

[illegible]

Figure 4. Pertussis cases by county, Missouri, 1993

Poliomyelitis, Acute (Polioviral fever, Infantile paralysis)

Poliomyelitis is an acute viral infection with severity ranging from inapparent infection to non-specific febrile illness, aseptic meningitis, paralytic disease and death. Symptoms of poliomyelitis include fever, headache, malaise, nausea and vomiting, muscle pain, stiffness of the neck and back and subsequent flaccid paralysis. Death can occur as a result of the failure of the respiratory muscles.

Poliovirus types 1, 2 and 3 (genus *Enterovirus*) are all capable of causing infection, illness and paralysis. The disease is transmitted through direct contact and man is the only known reservoir. Where sanitation is poor the major route of transmission is fecal-oral.

Missouri has not had a case of poliomyelitis reported since 1988. See Figure 1.

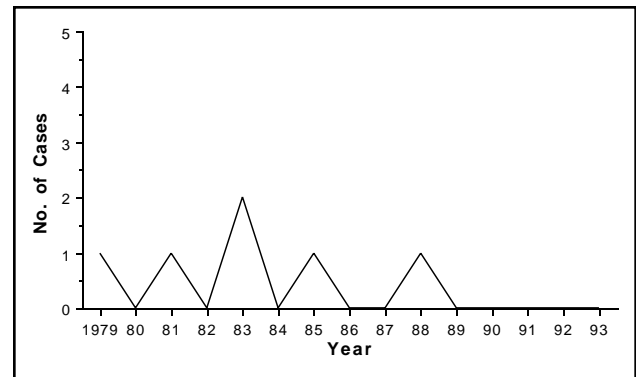


Figure 1. Poliomyelitis cases by year, Missouri, 1979–93

Rubella (German Measles)

Rubella is a mild febrile disease with diffuse punctate and maculopapular rash, sometimes resembling that of measles or scarlet fever. Children usually present with no well-defined symptoms. However, adults may experience symptoms of low-grade fever, headache, malaise, mild coryza and conjunctivitis. Up to 50 percent of the infections can occur without rash.

Congenital rubella syndrome occurs in greater than 25 percent of the women who contract rubella during the first trimester of pregnancy. The risk of a single congenital defect falls to 10–20 percent by the 16th week of pregnancy, and congenital defects are rare when the infection occurs after the 20th week. Fetuses infected early are at the greatest risk of intrauterine death, spontaneous abortion and congenital malformation of major organ systems. Congenital defects can be single or multiple.

Missouri had one reported case of rubella in 1992 and one in 1993, and has had five or fewer cases each year since 1986. See Figure 1. Rubella rates are very low due to high immunization coverage.

No cases of congenital rubella have been reported in recent years.

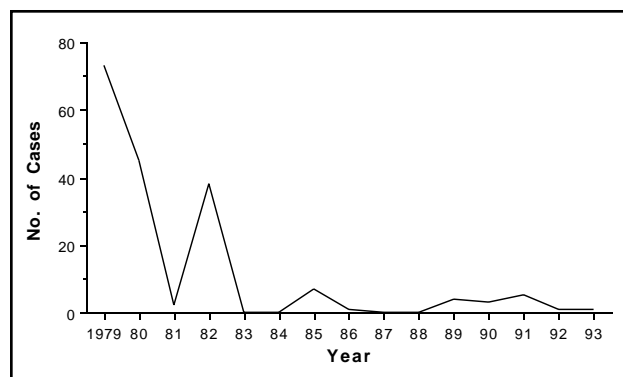


Figure 1. Rubella cases by year, Missouri, 1979–93

Sexually Transmitted Diseases

Chlamydia trachomatis Infections

Chlamydia trachomatis is a bacterial organism responsible for a wide range of sexually transmitted diseases, including non-gonococcal urethritis (NGU) and mucopurulent cervicitis (MPC). NGU is a common genital infection among males, while MPC is seen among women. The clinical manifestations of genital disease caused by this organism are indistinguishable from gonorrhea. In males, the disease may be asymptomatic in as many as ten percent of the cases. The possible complications of male urethral infections include epididymitis, infertility and Reiter's syndrome. In females, the clinical manifestations of *C. trachomatis* infections are similar to gonococcal infections, with the disease frequently presenting as a mucopurulent endocervical discharge, with edema and inflammation of the endocervical epithelium. Complications that can result from infections with this organism include salpingitis, infertility and ectopic pregnancy.

In Missouri, *Chlamydia trachomatis* infections reported in 1992 increased by 11.9 percent from the 10,643 reported in 1991 to 11,907 and then decreased 2.4 percent to 11,625 in 1993. See Figure 1. Widespread clinical therapy and dual treatment of all gonorrhea cases (gonorrhea therapy plus chlamydia therapy) has been utilized since 1988 and this along with extensive screening since 1987 may be contributing to the flattening of the curve of reported incidence since 1990.

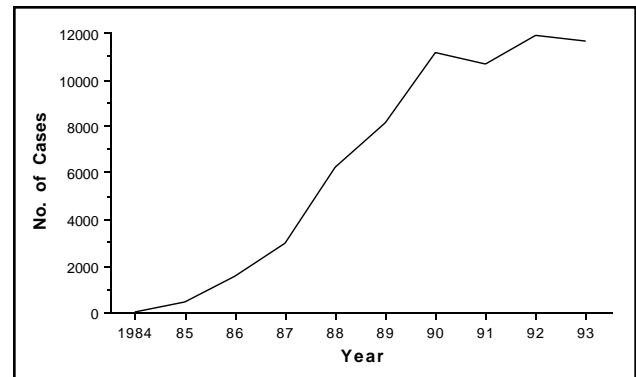


Figure 1. *Chlamydia trachomatis* cases by year, Missouri, 1984-93

Genital Herpes

Genital herpes is a sexually transmitted disease caused by the herpes simplex viruses (HSV-1 and HSV-2). Genital herpes is usually caused by HSV-2, although it can also be caused by HSV-1. Genital herpes occurs mainly in adults. The primary and recurrent lesions can occur without symptoms. In women, the infectious sites are the cervix and the vulva and recurrent disease usually involves the vulva, perineal tissue, legs and buttocks. In men, lesions appear on the glans penis or prepuce, and in the anal and rectal areas.

The primary mode of transmission of HSV-1 is by contact with saliva of infected carriers. Transmission of HSV-2 is usually by sexual contact. Both types can be transmitted to various sites by oral-genital or oral-anal contact.

In Missouri, genital herpes increased 13.5 percent from 3,244 cases in 1991 to 3,681 in 1992 and then increased 1.3 percent to 3,729 cases in 1993.

Gonococcal Pelvic Inflammatory Disease (GPID) (Gonococcal Salpingitis)

Pelvic inflammatory disease, or acute salpingitis, is a common complication of gonorrhea in women. This GPID has a major impact because of its acute manifestations and its potential long-term effects of pelvic discomfort and pain, infertility and ectopic pregnancy. Patients with salpingitis have symptoms of lower abdominal pain, abnormal menses and painful coitus.

In Missouri, GPID decreased 19.8 percent from 384 cases in 1991 to 308 reported in 1992 and decreased 12.7 percent from 1992 to 269 cases in 1993. The decrease occurred in all areas of the state.

Gonorrhea

Gonorrhea includes a number of inflammatory conditions of the genitourinary tract caused by *Neisseria gonorrhoeae*. Gonorrhea is a sexually transmitted, bacterial disease which affects epithelial tissues and differs in course in men and women.

In females, urethritis or cervicitis develops a few days after exposure to the infecting organism. In females, these cases are usually so mild that they go unnoticed. Chronic infections are common, especially in women. Anorectal and pharyngeal infections are common in both sexes. Conjunctivitis, which rarely occurs in adults, can cause blindness in infants if not treated rapidly.

In Missouri, the reported incidence of gonorrhea decreased by 14.7 percent from 17,450 cases in 1991 to 14,887 cases in 1992 and then decreased by 11.6 percent to 13,147 cases in 1993. See Figure 1. The incidence rate decreased to 251.2 per 100,000 in 1993. Decreases occurred in all major subdivisions of the state: St. Louis City reported a decrease of 393 cases, St. Louis County 362, Kansas City 975 and outstate Missouri 10. See Figure 2.

Gonorrhea was reported from all health districts in Missouri during 1993, with the highest incidence reported by the major urban areas and in the seven-county southeast "Bootheel" area. See Figure 3.



Figure 1. Gonorrhea cases by year, Missouri, 1979-93

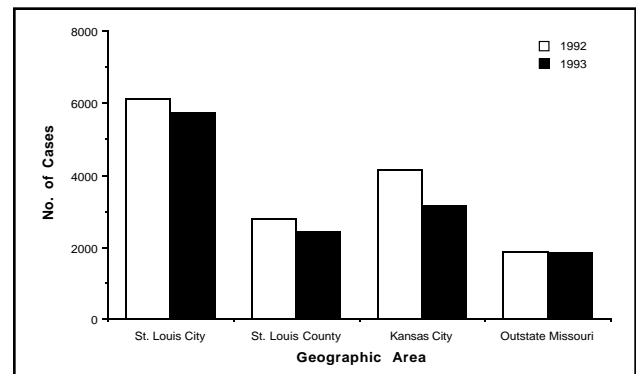


Figure 2. Gonorrhea cases by geographical area, Missouri, 1992-93

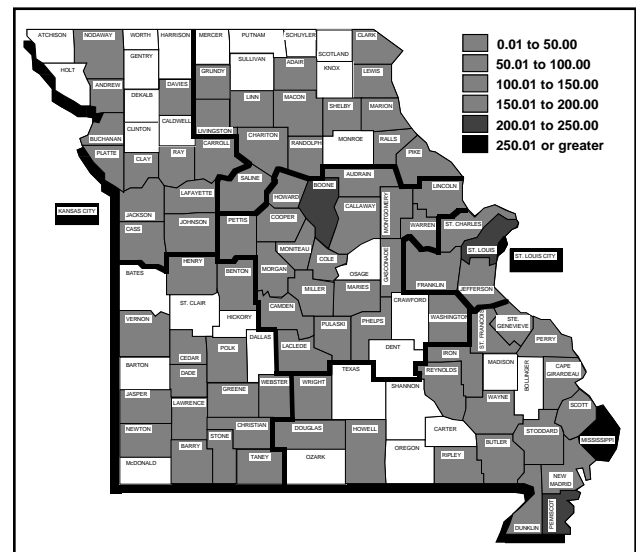


Figure 3. Gonorrhea incidence per 100,000 by county, Missouri, 1993

HIV/AIDS (Human Immunodeficiency Virus, Acquired Immunodeficiency Syndrome)

Human immunodeficiency virus (HIV) is a retrovirus of which two types have been identified, type 1 (HIV-1) and type 2 (HIV-2). Although these viruses are serologically distinct, they have similar pathological and epidemiological characteristics. HIV-1 infection is found in the Americas, Europe, sub-Saharan Africa and in most other countries. HIV-2 infection has been found primarily in West Africa and in western countries which have an epidemiological link to West Africa.

HIV is transmitted from person to person through sexual contact, the sharing of HIV-contaminated needles and syringes by injecting drug users and from an infected mother to her infant before or at the time of birth.

Acquired immunodeficiency syndrome (AIDS) is a specific group of diseases and conditions indicative of severe immunosuppression related to HIV infection. The clinical manifestations of HIV, unlike those of most other reportable diseases, do not usually develop until years after the infection. The average time between infection with HIV and a diagnosis of AIDS is approximately ten years. This long incubation period makes statistical analysis of HIV infection based on reported AIDS cases difficult.

The severity of HIV-related illness is directly related to the degree of dysfunction of the immune system. The onset of clinical illness is usually insidious with non-specific signs and symptoms such as lymphadenopathy, loss of appetite, diarrhea, weight loss, fever, fatigue and vaginal candidiasis. Over time, the immune system dysfunction associated with HIV infection worsens, making the individual increasingly vulnerable to certain serious opportunistic infections and cancers.

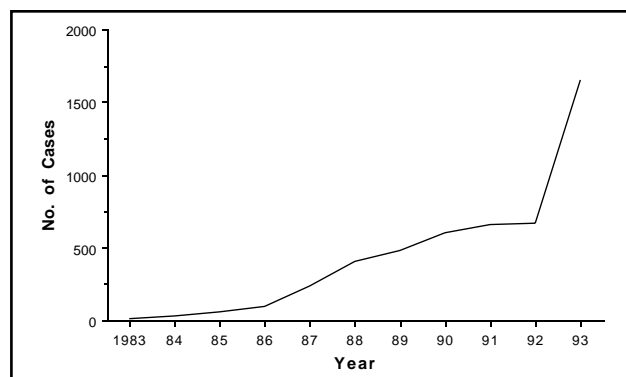


Figure 1. AIDS cases by year, Missouri, 1983–93

On January 1, 1993, the Centers for Disease Control and Prevention (CDC) expanded the AIDS case definition to include persons who are infected with HIV and have laboratory evidence of severely impaired immune function. The expanded definition emphasizes the clinical importance of the CD4+ lymphocyte count in monitoring HIV disease by including under the definition of AIDS all HIV-infected persons with CD4+ cell counts under 200 and/or a CD4+ percent of <14. Also, the new definition adds pulmonary tuberculosis, recurrent pneumonia and invasive cervical cancer to the previous list of 23 AIDS-indicator diseases or conditions.

The expansion of the surveillance case definition had a significant impact on the number of AIDS cases reported for Missouri in calendar year 1993. Of the 1,664 AIDS cases reported during this period, 1,024 (61.8%) were the direct result of the new case definition. During 1992, utilizing the new case definition, 662 AIDS cases were diagnosed and reported. The number of cases of AIDS in Missouri has increased each year since it became reportable in 1983. See Figure 1. There were 1,360 HIV infections reported in 1992 and 677 reported in 1993.

In addition to the changes in the numbers of reported AIDS cases associated with the expansion of the AIDS case definition, there has also been a change in the way in which Missouri HIV data are reported. Specifically, persons meeting the AIDS surveillance definition are no longer

included in the HIV data. This makes it possible to more accurately depict the epidemic and better describe the HIV disease continuum for Missouri. As a result of this change, direct comparison is no longer possible between HIV data from previous years and the current data. A consequence of this change is that in past years reports of HIV infections had been far more numerous than AIDS cases for the report year, but in 1993 AIDS cases were far more numerous than HIV infections. This is seen in Figures 2–7.

In 1992 and 1993, the largest number of AIDS and HIV infections occurred in the 20–29 and 30–39 year age groups. See Figures 2 & 3. Cases in these two age groups were primarily white males with black males forming the second largest group. See Figures 4 & 5.

Males comprised 93 percent of the total number of AIDS cases in 1992 and nearly 92 percent in 1993. The major risk behavior for AIDS and HIV infec-

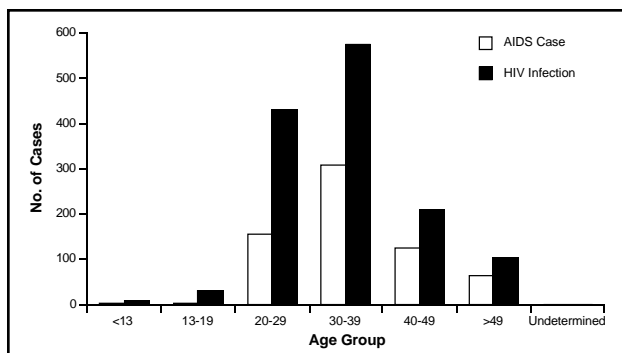


Figure 2. AIDS cases and HIV infections by age group, Missouri, 1992

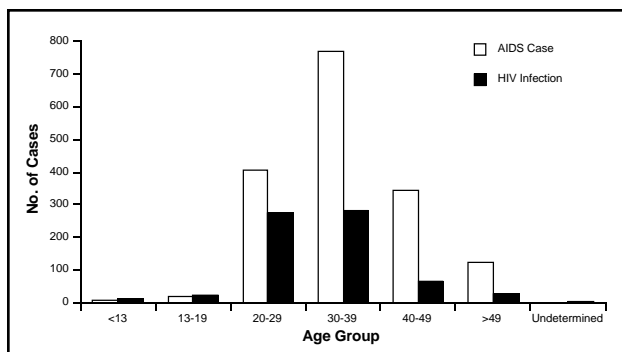


Figure 3. AIDS cases and HIV infections by age group, Missouri, 1993

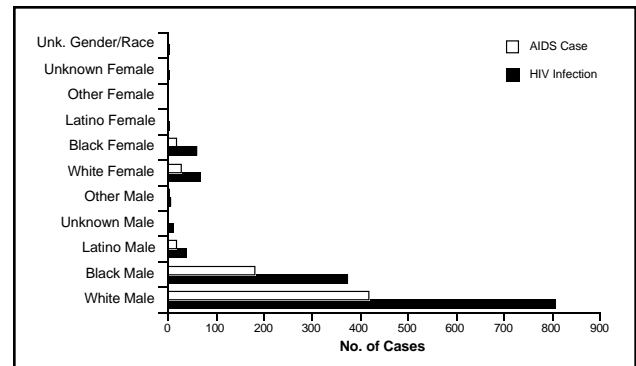


Figure 4. AIDS cases and HIV infections by race, Missouri, 1992

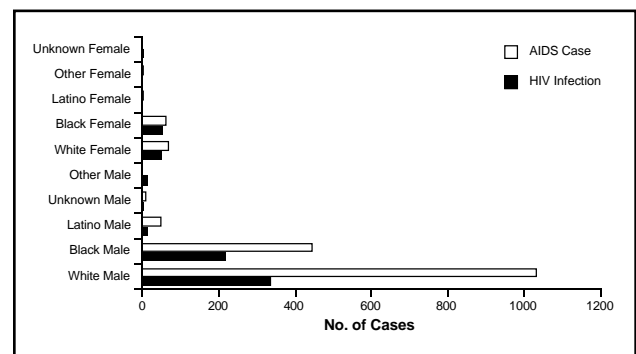


Figure 5. AIDS cases and HIV infections by race, Missouri, 1993

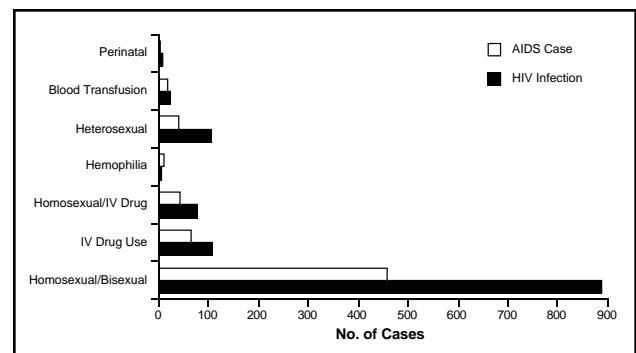


Figure 6. AIDS cases and HIV infections by sexual activity, Missouri, 1992

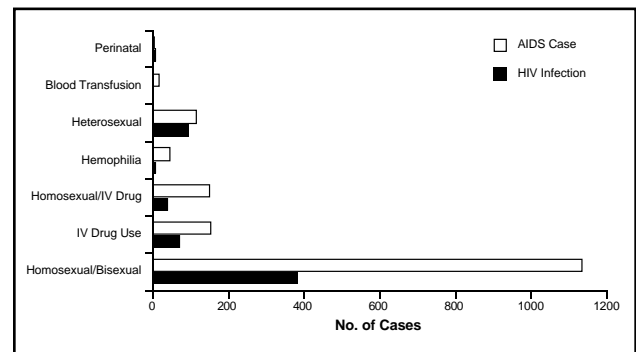


Figure 7. AIDS cases and HIV infections by sexual activity, Missouri, 1993

tion in males was homosexual/bisexual activity for both 1992 and 1993, with 71 percent of the reported AIDS cases being associated with this exposure category for 1992 and 70 percent for 1993. See Figures 6 & 7. Seventy-three percent of HIV infections in 1992 were in the homosexual/bisexual risk category and 63 percent in 1993. Heterosexual contact was the second largest risk factor for HIV in 1993 at 15.5 percent. Intravenous drug use was the other major risk factor for AIDS and HIV infection in 1992.

The predominate areas for reported cases of AIDS and HIV infection in 1992 and 1993 were the major metropolitan areas of St. Louis and Kansas City. See Figure 8. These areas reported 66 percent of the AIDS cases and 71 percent of the HIV infections in 1992. In 1993, these metropolitan areas reported 76 percent of the AIDS cases and 73 percent of the HIV infections.

The geographic distribution of AIDS cases in Missouri is shown in Figure 9. As of December 31, 1993, AIDS cases have been reported in residents of 94 of the state's 115 counties. Of those 21 counties which have not reported cases, all are adjacent to at least one county which has had two or more cases among its residents. In addition, five of the 21 counties with no reported AIDS cases have residents who have been reported as infected with HIV, but who have not progressed to AIDS. The AIDS epidemic has clearly been concentrated in the St. Louis and Kansas City metropolitan areas; 39.6 percent of all cases have been in residents of St. Louis City and St. Louis County, and 36.8 percent in residents of the Kansas City area.

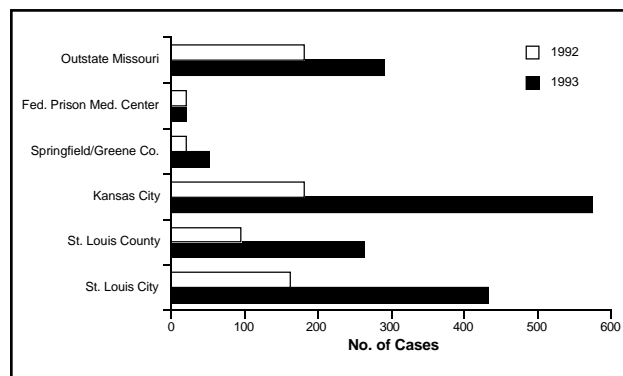


Figure 8. AIDS cases by geographical area, Missouri, 1992-93

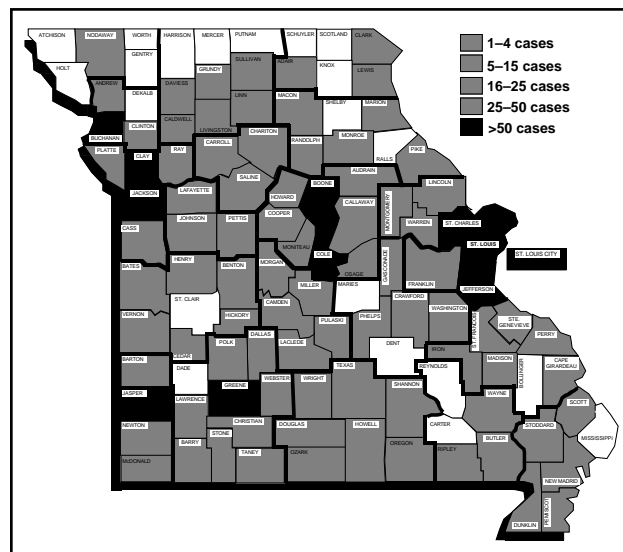


Figure 9. Cumulative AIDS cases by county of residence, Missouri, through December 31, 1993.

Non-gonococcal Urethritis (NGU)

While *Chlamydia* is the most frequently isolated organism in gonococcal-negative infections, there are a number of other agents involved in these infections. *Ureaplasma urealyticum* is considered to be the etiologic agent in 10–20 percent of chlamydia-negative cases of NGU.

In Missouri, reported cases of NGU decreased 24.2 percent from 9,068 cases in 1991 to 6,874 in 1992. In 1992, there was a further decrease of 6.5 percent to 6,425 cases. The decrease in 1992 occurred in St. Louis County (52.8%) and Kansas City (6.5%). See Figure 1.

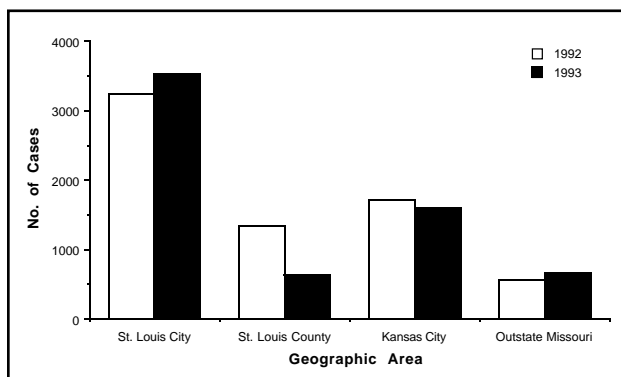


Figure 1. Non-gonococcal urethritis cases by geographical area, Missouri, 1992–93

Penicillinase-producing *N. gonorrhea* (PPNG)

Neisseria gonorrhoeae has become resistant to penicillin, ampicillin, amoxicillin, tetracycline, doxycycline and erythromycin. The resistance is due to the plasmid-mediated production of beta-lactamases or chromosomal mediated resistance. All gonorrhea is now considered to be resistant and is monitored by the participation of St. Louis and Kansas City in the National Gonorrhea Isolate Surveillance Project. Routine beta lactamase testing is no longer performed.

Syphilis (Primary, Secondary and Early Latent under one year)

Syphilis is both an acute and chronic disease caused by a spirochetal organism, *Treponema pallidum*. The disease is characterized by a primary lesion, a secondary eruption invading the skin and mucous membranes, and by late lesions of the skin, bone and viscera. Syphilis can have long latency periods and may involve the central nervous system (CNS) and cardiovascular system. The primary lesion (chancre) usually appears about three weeks after infection as a painless ulcer with a serous exudate at the site of the initial infection. After four to six weeks, the chancre begins to disappear and a generalized secondary infection may develop. CNS involvement and subsequent disease may occur at any of the stages of syphilis infection. Death or serious disabilities rarely occur with the early stages of syphilis; late manifestations of the disease, however, tend to impair health, limit mobility and shorten life expectancy.

Syphilis is transmitted by direct contact with infectious exudates from the early lesions of skin and mucous membranes, and by blood of infected persons during sexual contact. The incubation period for syphilis is usually three weeks and ranges from ten days to three months.

Early syphilis includes primary, secondary and early latent cases reported within less than one year from the date of infection.

In Missouri, the reported incidence of early syphilis increased by 118 percent from 819 cases in 1991 to 1,787 in 1992 and increased by 20.0 percent to 2,144 cases in 1993. Primary and secondary cases increased 16.0 percent, from 1,167 in 1992 to 1,354 cases in 1993. The 1993 primary and secondary rate of 25.8 per 100,000 was higher than the national rate of 10.6 per 100,000 for 1993.

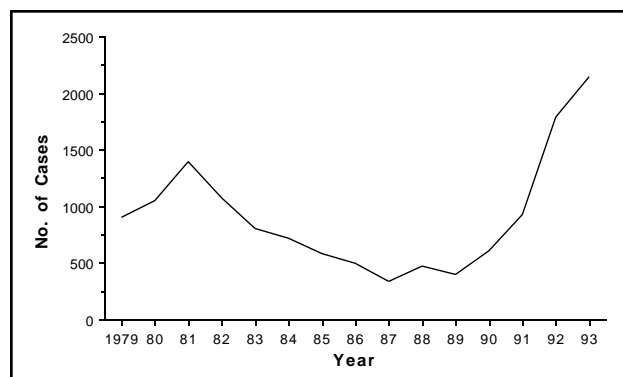


Figure 1. Early syphilis cases by year, Missouri, 1979-93

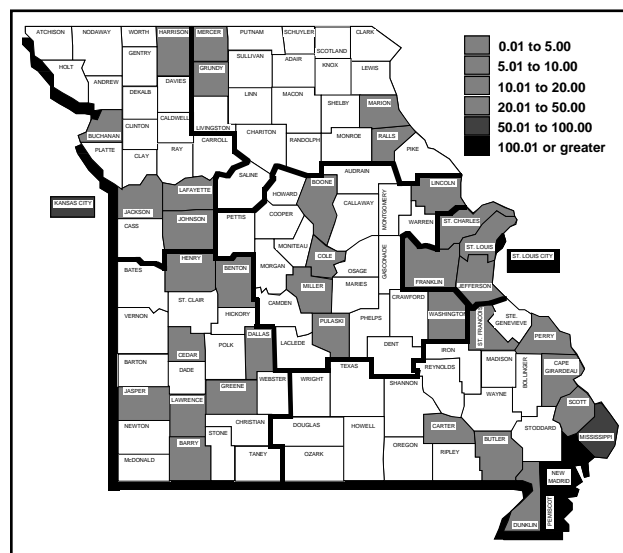


Figure 2. Early syphilis incidence per 100,000 population by county, Missouri, 1993

Early latent syphilis cases increased 27 percent, from 620 cases in 1992 to 790 in 1993. St. Louis City reported 62 percent of the early syphilis cases in 1993, 67 percent of the primary and secondary cases and 54 percent of the early latent cases.

The major urban areas reported the majority of early syphilis during 1993. However, a significant outbreak was identified in the seven-county southeast "Bootheel" area of Missouri as well as the area surrounding St. Louis City and St. Louis County. See Figure 2.

Congenital Syphilis

Congenital syphilis, which is a preventable disease, causes significant fetal mortality, and can cause serious illness, long-term sequelae and occasional deaths in affected infants and children. Transmission of *Treponema pallidum* from mother to fetus can occur across the placenta during the prenatal period, and also at the time of delivery through contact with infectious secretions in the birth canal. Infection of the child is most likely during early maternal syphilis, with the probability of transmission being 70-100 percent during the first four years after the mother acquires her infection. Subsequently, the likelihood of transmission decreases, although it can occur throughout the latent period.

At least half of infected liveborn infants do not have clinical evidence of disease at the time of birth (and if the mother acquired her syphilis infection late in pregnancy, she may not show any signs of disease before the time of delivery). Infants who develop signs of early congenital syphilis usually do so within the first few months after birth. If the mother has untreated early syphilis, up to 40 percent of pregnancies will result in stillbirths or perinatal deaths.

Congenital infections may result in late manifestations such as Hutchinson's teeth, saddlenose, saber shins, interstitial keratitis and deafness.

Transmission can occur from a child with early congenital syphilis to those with whom he or she has direct contact. The moist secretions found in early congenital syphilis are highly contagious.

During the past four years, there has been a dramatic increase in the number of reported cases of congenital syphilis in Missouri, paralleling the increase that has occurred in cases of primary and secondary syphilis in the state. In Missouri, the reported incidence of congenital syphilis signifi-

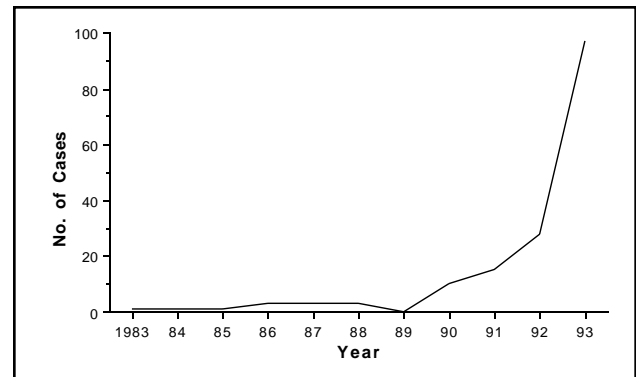


Figure 1. Congenital syphilis cases by year, Missouri, 1983-93

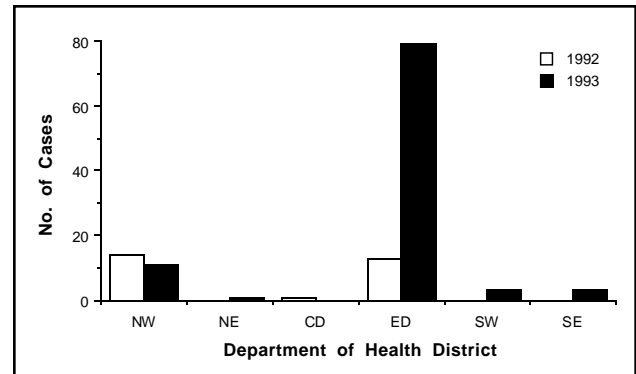


Figure 2. Congenital syphilis cases by health district, Missouri, 1992-93

cantly increased by 246 percent from 28 cases in 1992 to 97 cases in 1993. Since 1989, yearly increases have occurred in the number of reported cases. See Figure 1. Part of the increase in congenital cases beginning in 1990 is due to the revised and expanded surveillance criteria for congenital syphilis utilized since July 1, 1990. The increase in cases also reflects a true increase in the occurrence of infection in infants.

In Missouri, congenital syphilis cases have primarily been concentrated in the metropolitan areas of St. Louis and Kansas City, and especially during 1992. In 1993, cases occurred in all districts except Central District with the majority occurring in the St. Louis metropolitan area in the Eastern District. See Figure 2. This corresponds to the concentration of primary and secondary syphilis cases in

these same locations. Figure 3 shows the case rates by county in 1993. In Missouri, as elsewhere, congenital syphilis cases have occurred most frequently in persons who live in lower socioeconomic neighborhoods.

An additional factor which has been related to the occurrence of congenital syphilis is the use of illicit drugs, especially crack cocaine. Crack use has been associated with high risk sexual behaviors, and with the acquisition of syphilis. It has also been associated with lack of prenatal care among pregnant female users. While precise data on the relationship between illicit drug use and syphilis infection in Missouri is not available, there is substantial anecdotal evidence obtained by public health investigators which indicates that drugs, and especially crack cocaine, do play a significant role in promoting the spread of the disease in the state.

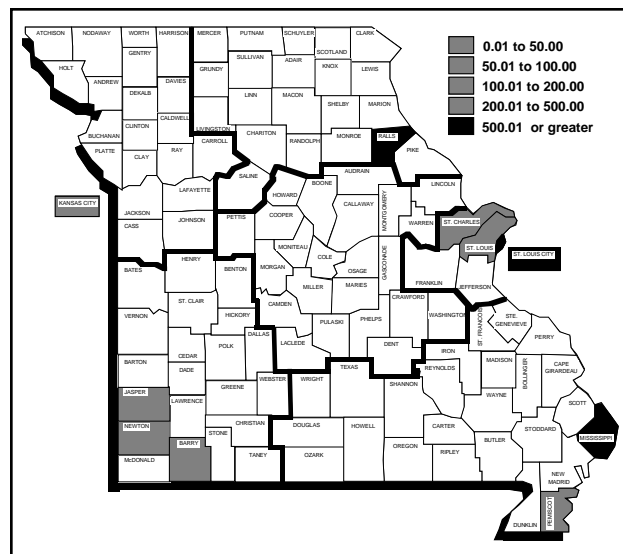


Figure 3. Congenital syphilis incidence per 100,000 live births by county, Missouri, 1993

Tuberculosis

Tuberculosis (TB) (*Mycobacterium tuberculosis*)

Tuberculosis is a systemic mycobacterial disease with diverse manifestations whose symptoms can often be mistaken for those of other respiratory illnesses. It is transmitted primarily by airborne droplet nuclei expelled by an untreated person with pulmonary or laryngeal tuberculosis. Most commonly, the lungs are the organs involved, but approximately 15 percent of the cases are extrapulmonary. Extrapulmonary tuberculosis may affect any organ or tissue, including the following: lymph nodes, pleura, pericardium, kidneys, brain, skin, eyes, peritoneum, larynx, bones and joints. Individuals with prolonged exposure or who are close contacts to an active case of tuberculosis are at a greater risk of becoming infected. About five to ten percent of those infected will develop active disease at some time throughout his/her lifetime. Individuals who are HIV positive and infected with tuberculosis are at a much higher risk—seven to ten percent each year. The initial infection usually is unnoticed and sensitivity to tuberculin does not occur until two to ten weeks later.

Groups at greatest risk of acquiring tuberculosis disease or infection are individuals with HIV, residents of homeless shelters, nursing homes, correctional institutions and foreign-born individuals. Health care workers dealing with at-risk populations are also at a greater risk of acquiring tuberculosis.

In Missouri, there were 245 cases of tuberculosis reported in 1992 representing a 3.9 percent decrease from the 254 cases reported in 1991. There were 256 cases reported in 1993, a 4.5 percent increase over 1992. See Figure 1.

After three decades of declining tuberculosis morbidity, the United States has experienced a continued increase since 1986. The 51,700 nationwide

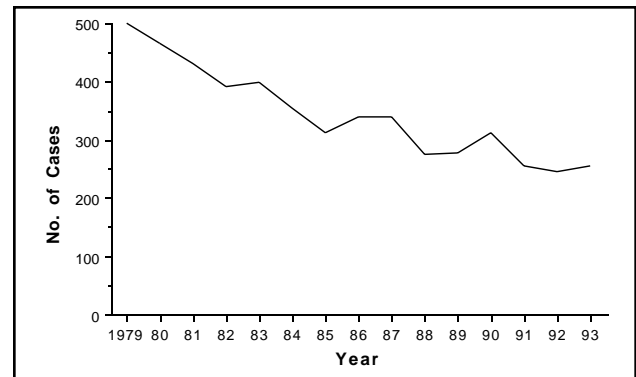


Figure 1. Tuberculosis cases by year, Missouri, 1979-93

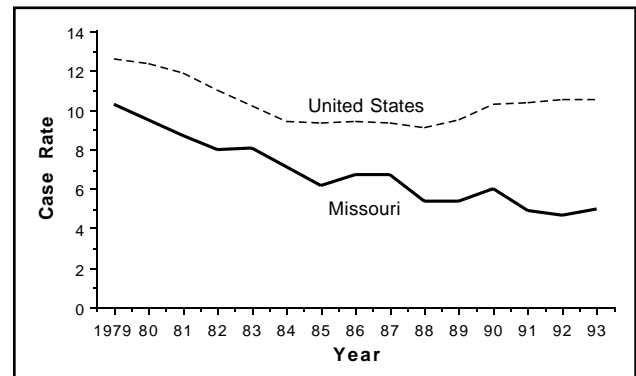


Figure 2. Tuberculosis case rates, Missouri and United States, 1979-93

excess in observed over expected cases from 1985 to 1992 has been primarily attributed to AIDS patients who were also infected with tuberculosis. The increased morbidity of tuberculosis occurred mainly in geographic areas and demographic groups which had large numbers of AIDS cases. The reverse trend was witnessed in Missouri with overall tuberculosis case rates declining from 1985 to 1992. See Figure 2.

Of great concern to public health officials, is the increasing number of tuberculosis and AIDS cases reported in Missouri. Of the 4,876 cases of AIDS reported among Missourians through 1993, 79 individuals (1.6%) were reported to have a diagnosis of tuberculosis as well. In 1992, 4.1 percent

(10/245) of the tuberculosis cases were also diagnosed with AIDS compared to 8.2 percent (21/256) in 1993. In addition, a total of 26 cases of mycobacteria other than tuberculosis (MOTT) were reported among AIDS patients. *Mycobacterium avium* complex continues to be the most common mycobacterium isolated from AIDS patients and was isolated from 16 patients (61.5%).

The elderly continue to make up a large percentage of the tuberculosis cases in Missouri. In 1993, 37.5 percent (96/256) of the cases occurred among individuals age 65 or older, an increase over 1992 when 37.1 percent (91/245) cases were reported. An increasing percentage of cases was also noted in the age groups under 25 years. The 0–4 year age group remained unchanged, accounting for 3.9 percent of the total cases, while the 5–14 year age group experienced a 450 percent increase and the 15–24 year age group experienced an 87.5 percent increase over 1992. See Figure 3.

The number of children in Missouri under the age of 15 with tuberculosis increased from 12 in 1992 to 21 in 1993, an increase of 82 percent. The increasing number of childhood tuberculosis cases under 15 years of age is also of special concern to public health officials.

In 1993, 66 percent of the cases occurred among whites, 26.2 percent among blacks and 7.4 percent among Asians. This represents a decrease in the percentage of cases occurring among blacks from 28.6 percent in 1992 and a decrease in the Asian population from 8.2 percent in 1992. Cases occurring among whites increased from 63.3 percent in 1992. See Figure 4.

The number of tuberculosis cases in St. Louis City among the black population remained unchanged in 1993, accounting for 65.1 percent of the morbidity, while in St. Louis County, the percentage

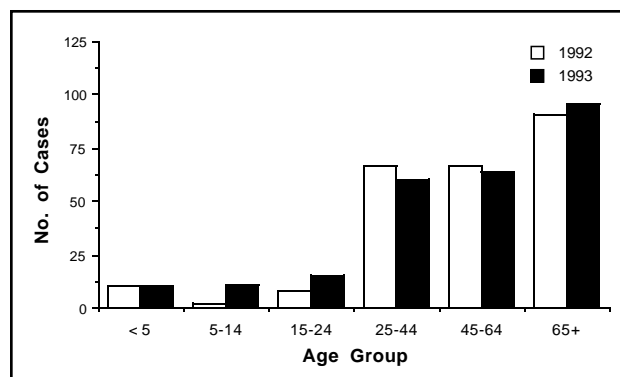


Figure 3. Tuberculosis cases by age group, Missouri, 1992–93

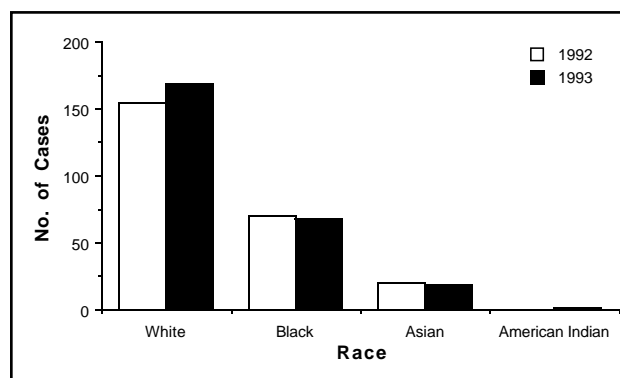


Figure 4. Tuberculosis cases by race, Missouri, 1992–93

of cases among blacks increased from 28.2 percent in 1992 to 36.1 percent in 1993. In Kansas City, the percentage of cases in blacks decreased from 58.3 percent in 1992 to 35.1 percent in 1993.

Missouri's minorities are experiencing a disproportionately higher incidence rate of tuberculosis. The overall incidence rate for minorities in Missouri was 14.3 per 100,000, with 12.3 for blacks, 48.0 for Asians and 4.5 for American Indians, compared to 3.8 for whites in 1993. Minority populations in Missouri are nearly four times as likely to contract tuberculosis than whites, with the rate exceeding that of the national rate of 10.5.

The number of tuberculosis cases varied by geographical area. Decreases of 2.3 percent and 7.7 percent respectively, were noted in St. Louis City and St. Louis County for 1993. The trend was reversed in Kansas City, which experienced an increase of 54.2 percent or 13 more cases over the number reported in 1992. See Figure 5.

In 1993, the outstate areas of Missouri accounted for the majority of reported cases of tuberculosis with 140 or 55 percent. The urban centers of the state, St. Louis City, St. Louis County and Kansas City accounted for the remaining 116 cases or 45 percent. See Figure 6.

Four health districts showed increases in the number of reported cases over the previous year, with the Eastern health district experiencing the largest increase of 145 percent or ten more cases than the seven reported in 1992. Increases were also noted in the Northwestern health district with 15 (+50%), Southwestern with 26 (30%) and Central with 29 (+7%). Two districts, the Northeastern with two (-80%) and Southeastern with 34 (-5%) experienced a decrease. See Figure 7.

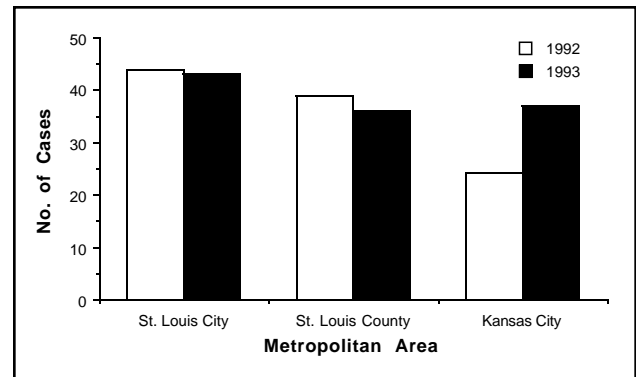


Figure 5. Tuberculosis cases by metropolitan area, Missouri, 1992-93

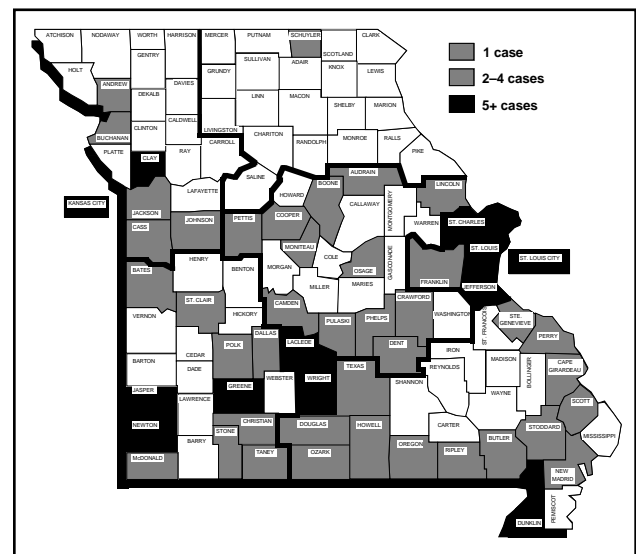


Figure 6. Tuberculosis cases by county, Missouri, 1993

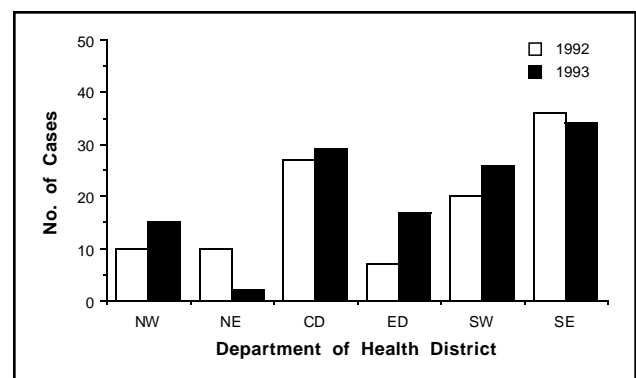


Figure 7. Tuberculosis cases by health district, Missouri, 1992-93

Zoonotic Diseases

Animal Bites

One-half to one million animal bites occur in the United States each year. Dogs account for over 75 percent of the bites, cats 15 percent and wild carnivores and humans account for the remainder. One percent of all emergency room visits are due to animal bites. Classified as the most serious of pet-associated health hazards, based on frequency, severity and financial expenditures, animal bites are estimated to be at least 50 percent under reported.

Children are at the highest risk, with an age adjusted attack rate for the 5–14 years age group of 1,000 per 100,000. Others at high risk are occupational groups such as meter readers, animal control officers and delivery personnel. Approximately ten percent of all animal bites require suturing and one to two percent require hospitalization. The fatality rate for animal bites is not known, but it is estimated that there are about ten fatalities per year. Larger dog breeds are responsible for more severe bites. Owned dogs protecting their territory are more likely to bite than strays. Medical costs average about \$75.00 per incident, and the total cost is estimated to be from \$38–75 million per year.

The most common infection associated with bites is *Pasteurella multocida*. Other organisms involved are *Staphylococcus aureus*, aerobic streptococci and anaerobes such as *Peptococcus spp.*, *Bacteroides spp.* and *Fusobacterium spp.* Other specific organisms can be involved with wild animals and rodents.

In Missouri, animal bites are poorly reported and come mainly from metropolitan areas. In 1992, 6,751 animal bites were reported and in 1993 6,503 were reported.

Arthropod-borne Viral Encephalitides

Encephalitis is an acute inflammatory process of the brain, spinal cord and meninges and is normally of short duration. Signs and symptoms are of central nervous system origin and include fever, severe headaches, stupor, disorientation, coma, spasticity, tremors and convulsions. Treatment is supportive in nature and post disease sequelae occur.

There are four encephalitides of importance in the United States: Eastern equine, Western equine, St. Louis and LaCrosse. All four encephalitides are vectored by specific mosquitoes or group of mosquitoes between birds, equine or humans. Man is a dead end host, since transmission does not occur from humans to other humans or animals. Fatalities are highest with Eastern equine encephalitis.

Methods of prevention involve a system of surveillance in the normal hosts of birds and equine and mosquito control to prevent the spread and transmission to man. Prior to 1993, Missouri did not have its own system of surveillance in the normal hosts. It relied on surveillance systems in Illinois, Ohio and other neighboring states. Passive surveillance was conducted in the equine species and an active surveillance system was conducted for human cases of disease.

Due to the great flood of 1993, active surveillance systems were conducted in the human and equine species and in mosquitoes during the summer of 1993. Over 1,759 mosquito pools, containing 123,863 mosquitoes, were analyzed for presence of St. Louis encephalitis. Virus activity was not detected in any species nor in mosquitoes. With the assistance of federal funds, active surveillance systems will be conducted in human, equine, wild bird, sentinel chicken flocks and mosquito populations in 1994.

Of the four encephalitides of importance in the United States, all but Eastern equine encephalitis have occurred in Missouri. Incidence of these diseases has been low during the past decade in Missouri and the United States. However, since sporadic cases continue to occur, it is evident that the virus is present in nature. With nature's change to a wetter ecology, which means more mosquitoes, the virus will amplify over a period of time and outbreaks of disease will occur. Experts tell us that these outbreaks usually occur two to four years after a major flood.

The Department of Health learned of one fatal case of LaCrosse encephalitis in a four-year-old child in August 1993 in Stone County.

Brucellosis

Brucellosis is a bacterial disease of humans, cattle, swine and dogs in the United States. The disease is characterized by an acute or insidious onset in humans with intermittent fever, headache, malaise, weakness, arthralgia and generalized flu-like symptoms that persist for an extended time period.

Historically, the disease was passed to humans from cattle via unpasteurized milk. With the advent of pasteurization of milk and the control and eradication of the disease in cattle, human brucellosis from cattle, with the exception of occupational exposure, has become a rarity. Canine brucellosis however, is emerging as a new zoonotic disease challenge. The dog breeding industry is faced with the task of initiating its own voluntary control and prevention programs. Since the canine is a companion animal with intimate social household contact with humans, the stage has been set for more transmission of this organism to humans. At this point, human brucellosis cases are not differentiated as to whether they are of *Brucella abortus* or *Brucella canis* origin.

In 1992 and 1993, Missouri had no reported cases of human brucellosis. See Figure 1. The State Public Health Laboratory discontinued serologic testing for brucellosis as of June 30, 1988. Commercial laboratories use a variety of tests which makes diagnosis in humans in Missouri difficult and may contribute to the low level of reporting.

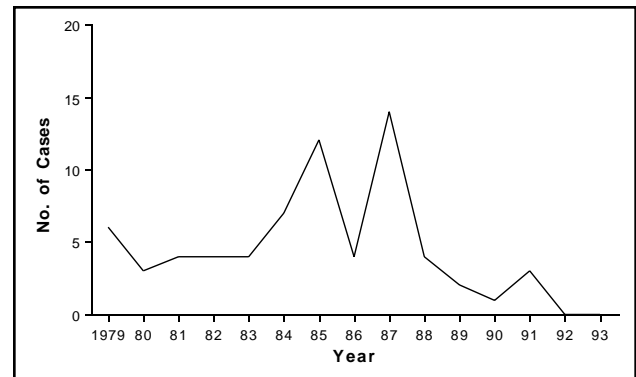


Figure 1. Brucellosis cases by year, Missouri, 1979-93

Ehrlichiosis

Ehrlichiosis is an acute febrile illness of humans, thought to be transmitted by the brown dog tick, *Rhincophalus sanguineus*. As with other tick-borne diseases, it has an acute onset with flu-like symptoms including headache, myalgia, anorexia, nausea and in some instances a rash. Clinical laboratory abnormalities include leukopenia, thrombocytopenia and elevated levels of hepatic aminotransferase. The causative organism *Ehrlichia chaffeensis* was isolated in 1991 in Arkansas.

Missouri has had a total of 88 cases since 1988, for an average of 14.7 cases per year. This represents a higher level than has been reported from any other state. There were 21 cases reported in 1992 and 17 cases reported in 1993. See Figure 1.

Figure 2 shows ehrlichiosis cases by county for 1993. Location was unknown for seven cases.

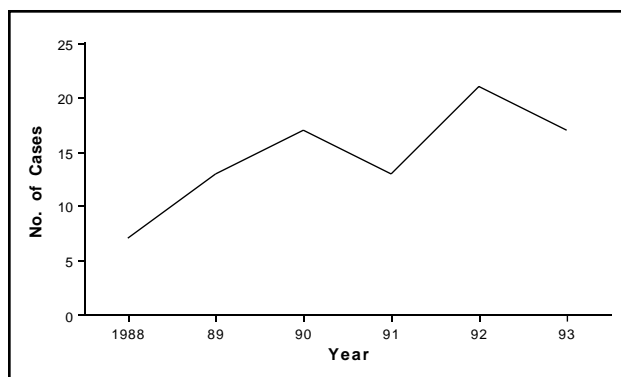


Figure 1. Ehrlichiosis cases by year, Missouri, 1988-93

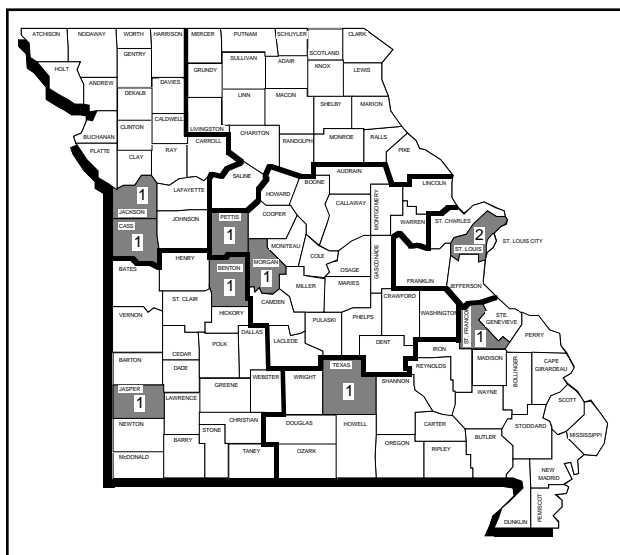


Figure 2. Ehrlichiosis cases by county, Missouri, 1993

Histoplasmosis

Histoplasmosis presents as a granulomatous disease of the lungs with varying degrees of severity. Normally children are infected while playing in dirt that contains histoplasma spore forms known as conidia; infection results from inhalation of airborne conidia. The disease usually causes sniffles for a few days, with the child not complaining of any illness. The healthy child wards off the disease and knowledge of infection is not known until later in life when chest x-rays show walled off old lesions of histoplasmosis.

Single point source outbreaks do occur when an area high in histoplasma spores is excavated and the airborne spores expose susceptible individuals. Casual contact with spore laden soil can cause disease in immunosuppressed individuals.

Histoplasmosis is an endemic mycotic disease in Missouri and the Missouri and Mississippi River Valley Regions. Field studies have shown up to 85 percent of rural Missourians skin test positive for histoplasmosis.

Historically, Missouri has averaged about 185 new cases of histoplasmosis per year. However, reported incidence dropped dramatically when the State Public Health Laboratory ceased providing diagnostic testing as of June 30, 1988. From 1990 thru 1993, there was an average of 14 cases reported per year. There were 12 cases reported in 1992 and 4 in 1993. See Figure 1.

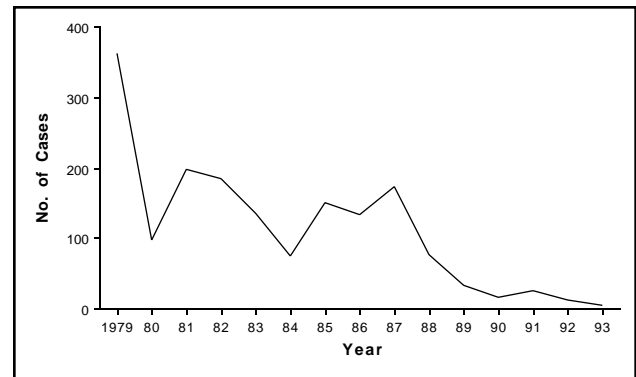


Figure 1. Histoplasmosis cases by year, Missouri, 1979-93

Leptospirosis

Leptospirosis is a bacterial infection of man and animals that is prevalent throughout the world. The disease manifests itself with a sudden onset, fever which maybe diphasic, headache, severe myalgia, conjunctival suffusion, rash with hemorrhage into the skin and mucous membranes, jaundice, renal involvement and meningitis resulting in mental confusion or depression. Illness can last from weeks to months. The organism is eliminated from the host via the kidney in the urine. Transmission in nature is by skin contact with urine contaminated water, soil or vegetation.

Prevalence of leptospirosis in animals in Missouri is high, causing sufficient disease and economic loss to justify the annual vaccination of cattle and canine. This, coupled with wild animal infection and transmission, should present a high incidence of leptospirosis in man. For various reasons, the disease is under reported and undiagnosed in man in Missouri and very few cases have been reported. In 1992, there were no cases reported and in 1993 three cases were reported. See Figure 1.

Figure 2 shows location of leptospirosis cases during the decade 1984-93.

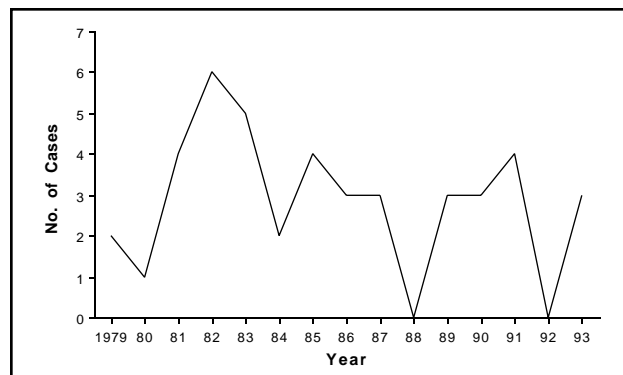


Figure 1. Leptospirosis cases by year, Missouri, 1979-93

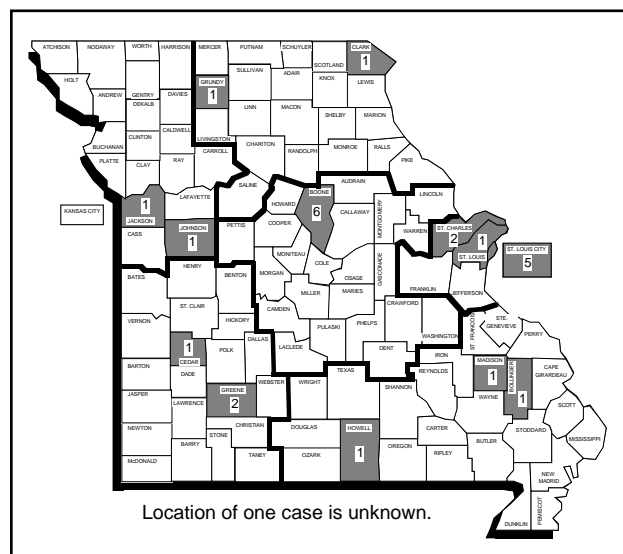


Figure 2. Leptospirosis cases by county, Missouri, 1984-93

Lyme Disease

Lyme disease, caused by the spirochete, *Borrelia burgdorferi*, was found in Old Lyme, Connecticut in 1975 to be transmitted by the *Ixodes scapularis* tick (formerly known in the east as *Ixodes dammini*). Subsequently, it has been found in other areas of the United States including the west coast, where it is transmitted by *Ixodes pacificus*. The illness often begins within 30 days of the tick bite with a characteristic skin lesion called erythema migrans (EM) which may be accompanied by generally mild systemic symptoms. Late arthritic, cardiac or neurologic manifestations may develop weeks after the initial tick exposure. The occurrence of Lyme disease in Missouri has been an enigma because the characteristic vector rarely bites humans in Missouri and the spirochete has been found only in rabbit ticks, *Ixodes dentatus*, which rarely bite humans. There have been numerous discoveries of spirochetes reacting with antibody tests in *Amblyomma* and *Dermacentor* ticks in Missouri, but all efforts to date to culture the bacteria from these ticks and humans have failed.

The number of reported Lyme disease cases increased dramatically after it was designated a reportable disease in Missouri in June 1989, then declined during 1992–93. See Figure 1. There were 150 cases reported in 1992 and 108 reported in 1993 which met the case criteria set by the Centers for Disease Control and Prevention and the Council of State and Territorial Epidemiologists. These included eight cases in 1992 and five in 1993 who were exposed outside of the state.

The highest incidence occurred in the 35–44 year age group in 1992 (4.6 per 100,000) and in the 45–54 year age group in 1993 (5.2 per 100,000). See Figure 2.

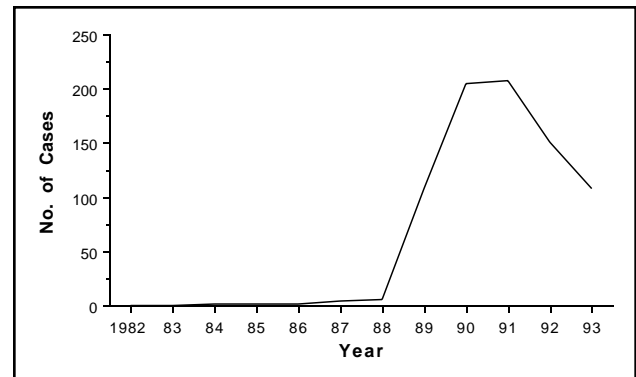


Figure 1. Lyme disease cases by year, Missouri, 1982–93

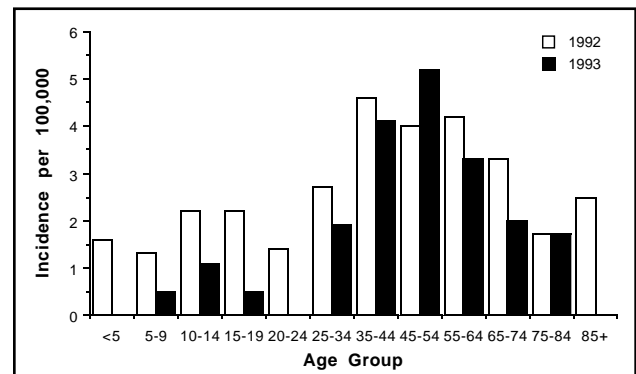


Figure 2. Lyme disease incidence by age group, Missouri, 1992–93

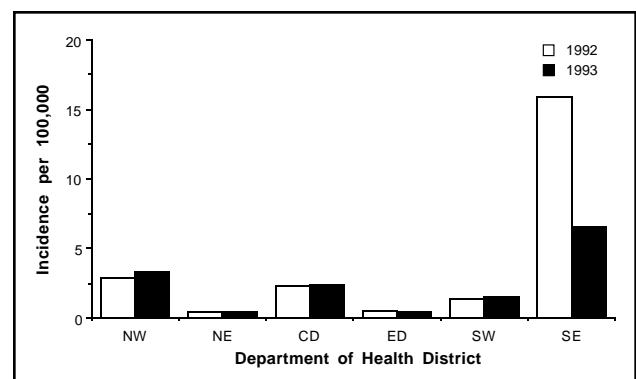


Figure 3. Lyme disease incidence by health district, Missouri, 1992–93

The highest incidence rates occurred in the South-eastern health district, with rates of 15.9 per 100,000 in 1992 and 6.6 per 100,000 in 1993. See Figure 3.

Figure 4 shows the rates by county in 1993.

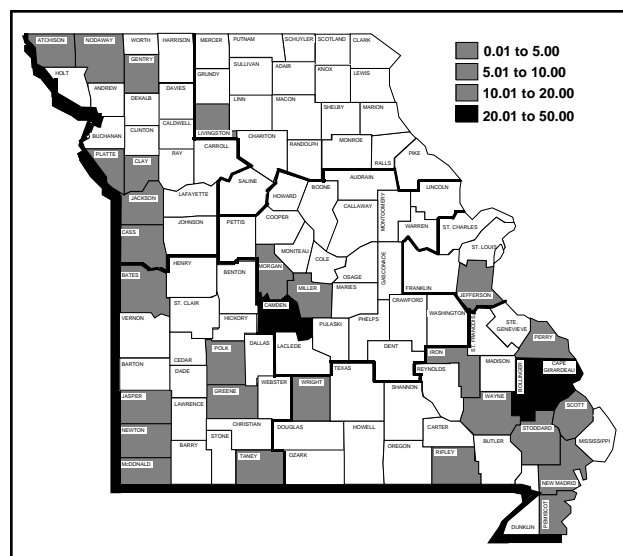


Figure 4. Lyme disease incidence per 100,000 by county, Missouri, 1993

Psittacosis

Psittacosis is a chlamydial disease of birds and man resulting in respiratory tract manifestation. The disease is characterized by flu-like symptoms of fever, headache and myalgia which can progress to pneumonia. Transmission is by direct contact and inhalation of the organisms from an infected host.

With the increased popularity of birds as companion animals and the poor quarantine measures for psittacine birds entering the United States, the incidence of psittacosis is increasing.

Missouri experienced an epizootic of psittacosis in aviaries in 1988. Prompt action limited the infection to birds, avoiding human cases of disease. One case of psittacosis was reported in 1992 and one in 1993. See Figure 1.

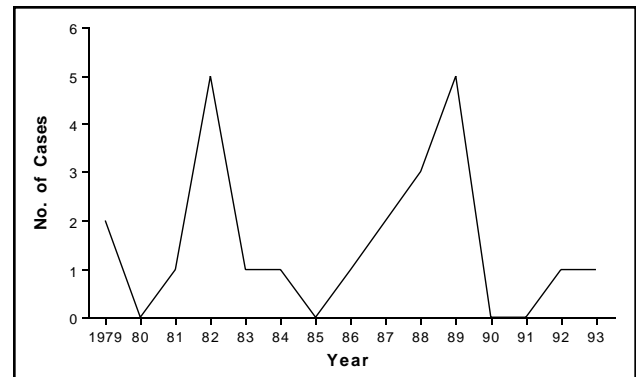


Figure 1. Psittacosis cases by year, Missouri, 1979–93

Rabies

Rabies is a fatal viral disease due to a rhabdovirus of the genus *Lyssa-virus*. It is a neurogenic virus which results in acute encephalomyelitis in all warm-blooded mammal species. The onset is usually benign in nature with a sense of anxiety, headache, fever, malaise and sensory changes at the site of a previous animal bite. The disease progresses rapidly to paresis, paralysis and/or muscle spasms. Death is due to respiratory paralysis. Missouri had its last human rabies case in 1952.

An estimated 50,000 cases of human rabies occur annually in the world, mostly in developing nations. The United States has had one to two human rabies cases a year for the past decade, with a number of these resulting from exposure outside the continental United States. See Figure 1. The decreased number of human rabies cases in the developed nations of the world is attributed to the control of stray animals and the mandatory vaccination of dogs and cats to serve as a buffer zone between the wildlife reservoir of rabies and the human populace. All animal bites are evaluated for possible rabies exposure and an estimated 50,000 post-exposure rabies treatments are administered annually in the United States. A passive surveillance system is utilized to detect the prevalence of rabies in the animal populations.

Missouri experienced a total of 37 reported cases of animal rabies in 1992 and 35 reported cases in 1993. This is a low incidence of animal rabies for Missouri. The number of cases dropped below 50 per year in 1974 and 1988, with 41 and 36 respectively. See Figure 2. The distribution of the disease throughout the state confirms the fact that rabies is endemic in the entire state. Over the past decade, rabies has occurred in 93 of 115 Missouri counties.

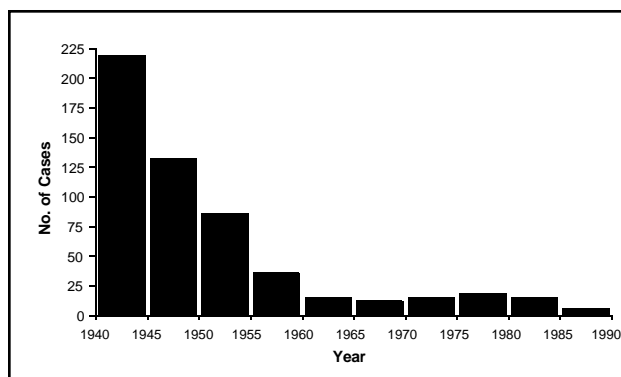


Figure 1. Human rabies cases by five-year intervals, United States, 1940-90

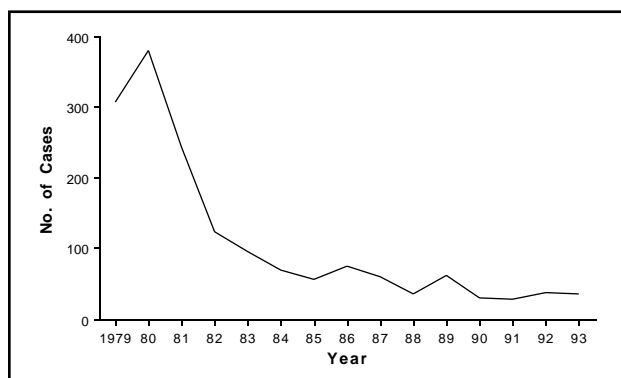


Figure 2. Positive animal rabies specimens by year, Missouri, 1979-93

The apparent low incidence of animal rabies can be attributed to two factors. A lengthy bus strike in 1990 resulted in the termination of bus service to many outlying counties so that fewer specimens came in from areas that serve as the wildlife reservoir. The second and perhaps most important reason for the declining incidence of animal rabies is the decrease in the skunk population, the primary reservoir of rabies in Missouri. This has reduced the interaction and consequent spread of the disease, which is transmitted by the bite of an infected animal to a new host. The low incidence of skunk rabies has also decreased rabies in other animals normally exposed to this reservoir.

The Department of Health has a model rabies and animal control document that all individual counties have the authority to implement. Counties are encouraged to modify this basic document to meet their requirements. The document is comprehensive and covers all aspects of observation periods, proper vaccination of dogs and cats, general animal control and dangerous animal control.

Rocky Mountain Spotted Fever

Rocky Mountain spotted fever (RMSF) is a rickettsial disease transmitted to man via the tick, *Dermacentor variabilis*, which is the reservoir for RMSF. Onset of the disease occurs 3–14 days after the infected tick has had a blood meal (engorged tick) on the susceptible individual. The organism is maintained in the midgut of the tick and is passed into the individual during the feeding process. It is also passed in tick fecal material and individuals can be infected by brushing the organism into abraded skin. Person to person transmission does not occur.

The disease is characterized by flu-like symptoms of fever, headache, malaise, myalgia and usually a maculopapular rash which appears on the palms and soles. The disease should be diagnosed by clinical signs and with either the CF or IFA test. The mortality rate can be as high as 15–20 percent in untreated cases. A four percent mortality is common.

Missouri has averaged 30–40 cases of RMSF per year during the last decade. With the cessation of diagnostic testing by the State Public Health Laboratory, the number of reported cases has dropped yearly. In 1992, there were 24 cases reported and in 1993 there were 20 cases reported. See Figure 1.

Figure 2 shows Rocky Mountain spotted fever cases by county for 1993. Location was unknown for two cases.

There were no deaths due to RMSF reported in 1993 and one death in 1992 for a case fatality rate of 4.2 percent.

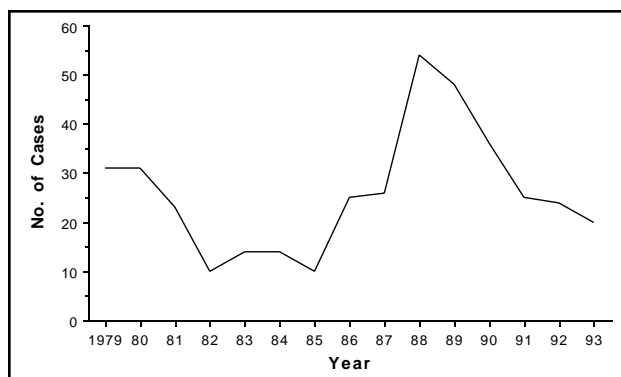


Figure 1. Rocky Mountain spotted fever cases by year, Missouri, 1979-93

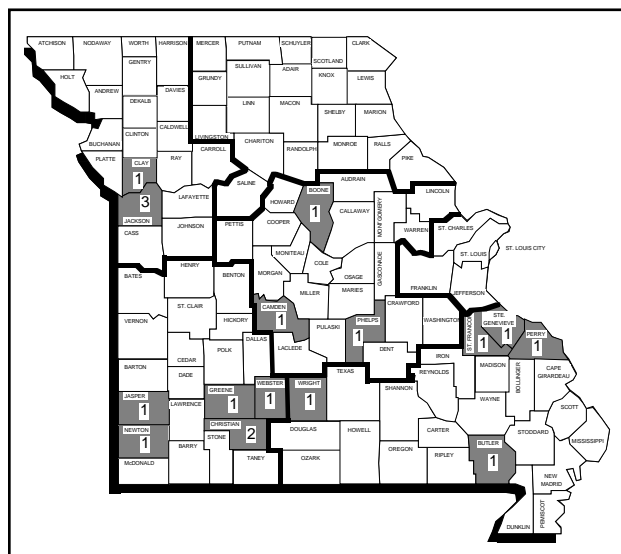


Figure 2. Rocky Mountain spotted fever cases by county, Missouri, 1993

Tularemia is a bacterial disease of wildlife and man. Wild rabbits are the primary reservoir. It is transmitted to man primarily through the blood meal of an infected tick or by direct contact with the organism while skinning or cleaning an infected wild rabbit. Infection can occur from contact with the organism either in contaminated water or meat or from the mouth of an animal which has just consumed infected meat. The disease manifests itself with an indolent ulcer at the site of inoculation and regionally enlarged, painful lymph nodes. Other routes of infection produce specifically related signs and symptoms. The disease can progress to systemic and pulmonary manifestation with a case fatality rate of five to ten percent.

Missouri and the Ozark Plateau are endemic for tularemia. Missouri and Arkansas usually lead the nation in total number of cases. Missouri has averaged 37.9 cases per year during the last decade, with half the cases being transmitted from tick bites and half from contact with infected rabbits. In 1992, there were 34 cases reported and in 1993 there were 17 cases reported. The decrease in recent years may be related to the cessation of testing for this disease by the State Public Health Laboratory. See Figure 1.

Year	No. of Cases
1979	21
1980	26
1981	28
1982	27
1983	51
1984	40
1985	36
1986	32
1987	58
1988	45
1989	40
1990	33
1991	44
1992	34
1993	18

Figure 1. Tularemia cases by year, Missouri, 1979–93

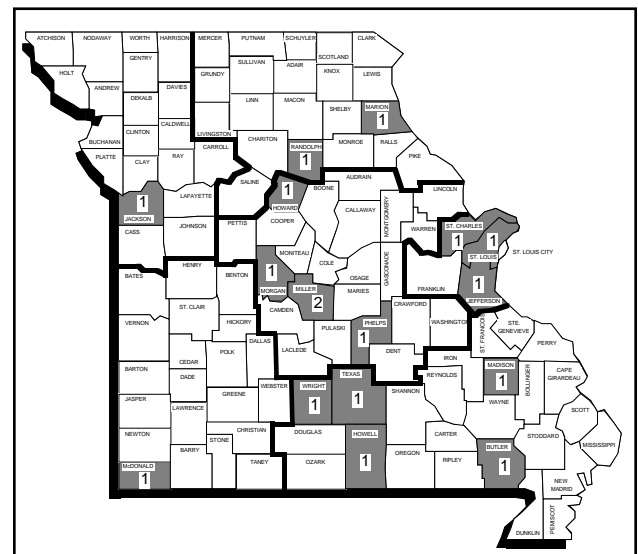


Figure 2. Tularemia cases by county, Missouri, 1993

Other Reportable Diseases

<u>Disease</u>	<u>1992</u>	<u>1993</u>
Chickenpox	10,009	9,609
Fifth Disease*	285	1,012
Pediculosis	8,670	7,305
Scabies	1,565	1,552
Scarlet Fever	620	542

*Erythema infectiosum or human parvovirus infection

Source: Data from active and passive surveillance systems

Diseases of Low Incidence

<u>Disease</u>	<u>1992</u>	<u>1993</u>
Kawasaki Disease	8	3
Legionellosis	28	33
<i>Listeria monocytogenes</i>	16	17
Malaria	12	9
Tetanus	1	1
Toxic Shock Syndrome	9	2

There were no reported cases of anthrax, botulism, plague or trichinosis during these two years.

Other Reportable Conditions

Childhood Lead Poisoning

Childhood lead poisoning is one of the most common environmental pediatric health problems in the United States today, and is entirely preventable according to *Preventing Lead Poisoning in Young Children* published by the Centers for Disease Control and Prevention in October 1991. Virtually all children in the United States are at risk for lead poisoning; no socioeconomic group, geographic area or racial or ethnic population is spared. Missouri's large lead mining and smelting industry places its citizens at even higher risk for lead poisoning.

Lead is a neurotoxin. Lead poisoning may result in decreased intelligence, impaired neurobehavioral development and cognitive function, decreased growth, and visual and hearing deficits. It may also result in adverse effects on the central nervous, renal (kidneys) and hematopoietic (blood-producing) systems. Very high levels or prolonged exposure result in coma, convulsions and death. However, most lead poisoned individuals have no warning signs or symptoms. Scientific evidence has shown that adverse health effects in children occur at blood lead levels of 10 µg/dL (ten micrograms of lead per deciliter of whole blood).

Lead enters the body through inhalation and ingestion. Sources of lead exposure include industrial or occupational, such as lead smelting, plumbing and automotive repair; hobbies, such as ceramics, stained glass-making and casting ammunition and fishing weights; soil and dust with high lead levels from paint, leaded gasoline emissions and industry; drinking water contaminated by lead pipes or lead-soldered joints; and folk medicines.

Although there are many sources of lead found in the environment, lead-based paint is the most common source of lead exposure for children. In 1978, paint with high concentrations of lead was

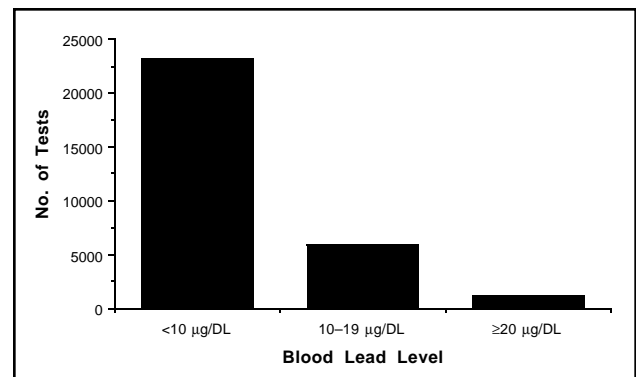


Figure 1. Reported childhood blood lead levels, Missouri, 1993

banned for household use, but houses built before 1980 often still contain lead-based paint. As this paint flakes, chalks or is disturbed during renovation, paint chips and dust are created. The normal hand-to-mouth activity of young children places them particularly at risk for being adversely affected by this exposure.

Elevated blood lead levels (≥ 10 µg/dL in persons under age eighteen or ≥ 25 µg/dL in persons age eighteen or more) became a reportable condition in Missouri effective April 1993. Data on lead exposure has been collected since that time. The number of tests performed has increased due, in part, to the 1993 Department of Health and Human Services, Health Care Financing Administration mandate that Healthy Children and Youth exams include a screening to assess a child's risk for lead poisoning. Increased testing can also be attributed to more widespread knowledge of citizens and health care providers of the harmful effects of lead and to collaborative efforts with the St. Louis City and St. Louis County health departments.

In Missouri, there were 30,193 blood lead tests on children less than six years of age reported in 1993. Of these 30,193 tests, 5,875 (19.5%) had blood lead levels of 10 to 19 µg/dL and 1,213 (4.0%) had levels of ≥ 20 µg/dL. See Figure 1.

There were 2,877 children tested, with 477 (16.6%) with blood lead levels of 10 to 19 $\mu\text{g}/\text{dL}$ and 184 (6.4%) with levels of ≥ 20 $\mu\text{g}/\text{dL}$, through the Children's Mercy Hospital of Kansas City.

The majority (22,356) of 1993 blood lead tests were reported from St. Louis City and St. Louis County. Of these 22,356 tests, 4,752 (21.3%) had blood lead levels of 10 to 19 $\mu\text{g}/\text{dL}$, for an incidence rate of 39.3 per 1,000, and 955 (4.3%) had levels of ≥ 20 $\mu\text{g}/\text{dL}$, for an incidence rate of 7.9 per 1,000. See Figure 2.

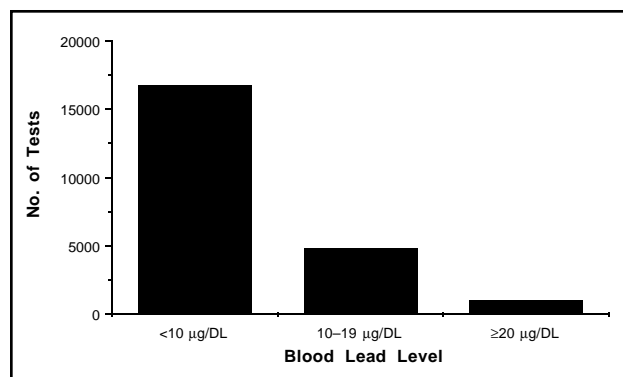


Figure 2. Reported childhood blood lead levels, St. Louis City and St. Louis County, Missouri, 1993